

Commercial Fisheries Abstracts

a monthly summary of important developments
for the fishery industries

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FISH & WILDLIFE SERVICE

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Vol. 12 No. 1

January 1959

Fish and Wildlife Service
U. S. Department of the Interior
Washington D. C.



Commercial Fisheries Abstracts



*Prepared in the Division of Industrial Research and Services
Bureau of Commercial Fisheries*

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Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

- | | | |
|---------------------------|----------------------|----------------------|
| 0 General and theoretical | 3 Preserved fish | 7 Analytical Methods |
| 1 Fish by species | 4 Oils | 8 Composition |
| 2 Fresh fish | 5 Vitamins | 9 Miscellaneous |
| | 6 Fishery byproducts | |

2, 1121 HOW TO MATCH TRAWL SIZE TO ENGINE POWER ON INSHORE VESSELS

Dickson, W. (Marine Laboratory, Torry, Aberdeen, Scotland)
World Fishing 7, 47, 48-49 (July 1958)

There is a remarkable constancy in engine power at around 40 h.p. per crew member on all sizes of offshore trawlers. For fly dragging seiners, the constant is about 20 h.p. per crew member. Trawling confined. -- A disadvantage of low-horsepower boats is the low speed of towing. This limits trawling to certain species. A fishing boat should tow at one-third free running speed, and at that speed, should give two-thirds of the pull exerted when roped to the quay with the engine opened up. This is known as bollard pull and is extremely useful when deciding the size of gear a boat can tow. Bollard pull can be determined by passing a rope through a pulley to a few bags of sand and removing the sand until the boat just lifts them.

Matching boards and net. -- Other boards should be capable of spreading the net to between one-half and two-thirds of headline length, with allowances for differences in length of wings. The spread between wing tips should be equal to the length of one wing-piece plus the length of the headline bosom. The following table shows changes expected with horsepower changes.

B, h. p. of engine	15	20	30	40	60
Speed in knots	5	5½	6	6½	7½
Towing speed in knots	1.7	1.8	2	2.2	2.5
Bollard pull in cwt's.	2.3	3.4	6	9	15
Thrust at towing speed in cwt's.	1.5	2.3	4	6	10
Size of otter board in sq. ft.	3½	4	6	7½	9½
Number of 4½ meshes of 12/15's cotton twine around mouth	150	170	210	230	260
Headline length in feet	24	27	33	37	42

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Richard L. McNeely

2, 118 FREEZING AND STORING DEEP-SEA LOBSTERS--SOME TESTS ON COOKED WHOLE LOBSTERS

Slavin, Joseph W. and Peters, John A. (Fishery Technological Laboratory, Bureau of Commercial Fisheries, East Boston, Massachusetts)
Commercial Fisheries Review 20, 1-6 (July 1958)

The problem of keeping deep-sea lobsters alive aboard commercial fishing trawlers has prevented the full exploitation of the deep-sea lobster resource that was discovered off the coast of Massachusetts by the research vessel, Delaware. A satisfactory method of preserving these lobsters at sea would contribute to their greater utilization.

Rather than attempting to keep the lobsters alive at sea, it may be better to find another method of preservation. A possibility is to freeze the cooked whole lobsters aboard the vessel. Either a blast freezer or an immersion freezer is the logical choice for this purpose because these methods are well suited for freezing irregularly shaped items, and the necessary equipment can be installed easily on a fishing vessel. In order to decide whether or not this is a feasible method of preparing lobster for the market, it was necessary to discover the storage life of lobsters frozen under these conditions.

Experimental procedure. -- The lobsters used in these tests were caught by the Bureau of Commercial Fisheries trawler, Delaware, kept alive in a tank supplied with circulating sea water, and upon being unloaded from the vessel, trucked to a local lobster pool. The live lobsters were cooked for 30 minutes in boiling sea water in a large wooden tank. They then were removed from the tank, cooled in air, and frozen either in the laboratory immersion freezer or the laboratory blast freezer.

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COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 1
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

TRAWL SIZE MATCHED TO ENGINE POWER

FREEZING LOBSTER AT SEA

2, 15 THE WASHING OF USED ICE WITH SEA WATER

Georgala, D. L.,
Annual Report, Fishing Industry Research Institute 1957, Cape Town, South Africa 11, 12 (1958)

Previous tests have been repeated to ascertain whether the storage life of fish might be adversely influenced if they were stored in used ice which had been washed with sea water, carrying a load of bacteria of order of 13,000 per ml.

Four storage experiments were conducted, using prime hake of the last day's catch of individual trawlers. On each occasion equal numbers of hake were iced with washed used ice and with newly crushed unused ice. At three subsequent intervals (3 to 5 days, 7 to 8 days and 11 to 12 days) four fish were withdrawn from the two types of ice and submitted to an odor evaluation. In all four experiments viable bacterial counts were performed (by the rolltube technique) on the two types of ice, while in the first two experiments the same technique was used to determine the numbers of viable bacteria on the skins of the fish withdrawn for odor evaluation.

Table 3. --Bacterial content of trawler ice.

Type of ice	20° C. Bacterial count/gm.			
	Exp. 1	Exp. 2	Exp. 3	Exp. 4
Newly crushed ice	13	4,620	1,030	7,800
Washed used ice	7,600	14,300	15,000	59,000

although the counts on the washed used ice were higher than on the new ice, they were insufficient to cause any increase in the skin count of the fish with which the ice came into contact.

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Reprinted in whole

2, 19 ROUND HADDOCK LANDINGS IN NEWFOUNDLAND: QUANTITY AND QUALITY RELATIVE TO GUTTED HADDOCK

Templeman, Wilfred and Fleming, A. M. (Fisheries Biological Station, St. John's, Newfoundland)
Journal of the Fisheries Research Board of Canada 15, 517-527 (July 1958)

Introduction. -- In the fall of 1953, large haddock became scarce on the Newfoundland banks. Fish plants that previously had refused to accept haddock less than 18 inches in length for filleting began to handle large quantities of 13-to-17-inch unviscerated haddock. The landing of round haddock raised questions in regard to the relative quality of fillets cut from round fish as compared with the relative quality of fillets cut from eviscerated fish.

Castell and MacCallum (1953) showed that fillets cut from properly iced, ungutted and gutted American plaice (Hippoglossoides platessoides) were indistinguishable in quality if cut from plaice held for no longer than 4 days in ice. From the 4th to the 7th day, the unviscerated plaice deteriorated more rapidly than did the eviscerated plaice. No significant differences appeared in either bacterial counts or trimethylamine (TMA) values for freshly cut fillets from eviscerated or unviscerated plaice that were held for up to 7 days in ice. Softening of the flesh and liver stains contributed to the inferior condition of the unviscerated plaice after the 4th day.

Purpose. -- This study was made to learn if differences in freshness as judged by the TMA values of the fillets would appear between unviscerated and eviscerated haddock.

Experimental. --Haddock used in this study were caught by and iced aboard the research vessel Investigator II or caught by and iced aboard a commercial trawler operating out of St. John's. Irrespective of the type of vessel used to catch the haddock, the fish were divided into two lots and

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COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 1
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerd

WASHING USED ICE WITH SEA WATER

ROUND VS. GUTTED HADDOCK

The solution used as freezing medium in the immersion freezer consisted of corn-syrup solids (34 percent by weight) and salt (NaCl--12 percent by weight) dissolved in tap water. This solution was kept to 3° F. before being used to freeze the lobsters. During the freezing process, the brine was kept in circulation by a 1/3-horsepower laboratory-type mixer. The lobsters were frozen by being immersed in the 3° F. freezing solution and held there until they reached an internal temperature of 8° F. After the excess solution had drained from the frozen lobsters, they were transferred to a wooden box and stored in a 0° F. commercial-type cold-storage room.

The blast freezer used in these experiments was similar to many used in commercial freezing plants. Eleven cooked whole lobsters, which weighed a total of about 50 pounds, were placed in a single layer on an expanded metal shelf of the freezer truck, and the truck was placed in the blast-freezer room, which had been precooled to -11° F. After these lobsters had been cooled to an internal temperature of 3° F., they, too, were placed in a wooden box and stored at 0° F.

The lobsters were removed from storage at short intervals and graded by a taste panel for appearance, odor, flavor, and texture.

Results.--The results of the study indicate that (1) deep-sea lobsters can be frozen on board a fishing vessel either in an immersion freezer or in a blast freezer and (2) they can be satisfactorily stored, unpackaged, at 0° F. for 2 to 4 weeks.

If other than 12/15's thread is used, the size of the net must be altered to spread adequately the headline to proper proportions.

The drag of a net depends first on the net size or area. Secondly, there is a factor of mesh size to be dealt with. Thirdly, there is a twine factor, which depends on twine diameter and not on weight or runnage. Lastly, there is a factor of towing speed. These factors allow the development of a simple formula:

$$\frac{Dm}{Ds} = \frac{(Mm Nm)^2}{(Ms Ns)} \times \frac{(Ps Re)^{\frac{1}{2}}}{(Mm) (Pm Rm)} \times \frac{(Vm)^2}{(Vs)}$$

Drag Area
ratio factor

Mesh
factor

Twine
factor

Speed
factor

Where:

D = Drag

M = Mesh size

N = Number of meshes around the mouth

P = Specific gravity of the twine

R = Rungage of twine

V = Towing speed

Suffix "s" denotes the standard or known set of conditions

Suffix "m" denotes the modified set of conditions

A common fault seems to be the choosing of a net and gear that are too big rather than too small for a boat of a given size. Advantages of increasing towing speed, better spread, easier handling, less mending, and lower costs are to be gained by selection of a smaller net and smaller gear.

processed immediately as follows: The haddock in lot 1 were washed and iced immediately in aluminum fish boxes, and the boxes were stored in the hold of the vessel. Haddock in lot 1 were re-iced when necessary. The haddock in lot 2 were handled in the same manner as were the haddock in lot 1 except that they were eviscerated before they were washed, iced, and stored in the hold. Haddock in lot 2 were re-iced when necessary. When the vessels arrived on shore, the haddock were removed from the ice and filleted immediately. All fillets were skinned and trimmed in the usual way. In some instances, TMA determinations were made immediately on the fresh fillets. Otherwise, the fillets were held at -18° C. for the determination of TMA. Determinations of TMA were made individually on minced samples of two fillets from each fish by the Federal Department of Fisheries, Fish Inspection Laboratory at St. Johns, according to the colorimetric method of Dyer (1945).

Results.--Fillets from round haddock averaged 0.66 milligrams (mg.) TMA per 100 grams of fillet. Fillets from eviscerated haddock from the research vessel averaged 1.39 mg. TMA per 100 grams of fillet. Fillets from eviscerated haddock from commercial trawlers averaged 1.61 mg. TMA per 100 grams of fillet. These differences were not statistically significant. By using TMA values as indicators of spoilage, round haddock were kept in ice up to 9 days under experimental conditions, and the fillets from these haddock still remained unspoil.

Discussion.--These studies showed no differences in the freshness of fillets cut from either unviscerated or eviscerated haddock as judged by TMA values. The TMA values obtained do not answer all of the questions concerning spoilage and the relative quality of haddock fillets. Other means of assaying spoilage and determining quality may be useful in answering many of the questions that arise when fresh fish are stored or are in transit.

The odor evaluation of the stored fish confirmed that the use of ice washed with sea water had either very little adverse effect or, more often, an actual beneficial effect on the storage life of the fish. This can be seen from table 4 (omitted), which shows the average odor panel scores, at three different intervals, in the four experiments.

The bacteriological investigations in the first two experiments confirmed the odor panel findings, as can be seen from figure 1 (omitted). The counts on fish stored in washed used ice were lower than on fish stored in new ice.

It appears, therefore, that under present conditions the use of ice washed with sea water has no adverse effect on the storage life of fish stored in such ice. The reasons for the slight improvement in storage life of fish stored in the harbor water washed ice are being investigated.

3. 2341 LUFFTFRYSING AV SILD (AIR-BLAST FREEZING OF HERRING) Lorentzen, Gustav Report on Technological Research Concerning Norwegian Fishing Industry III, No. 9, 24 pp. (1958) (English summary) The purpose of this work is to provide more accurate data for the calculation and design of air-blast freezers for herring and similar fish. Fifty-eight samples were frozen in the following types of packing: (1) 50 kg. standard, wooden herring boxes without lid, (2) 50 kg. standard, wooden herring boxes with lid on, (3) 22 kg. flat cardboard boxes without lid, and (4) 22 kg. flat cardboard boxes with lid on. For the two latter types, tests were made also to ascertain the influence of adding water and alginate jelly to the herring for "block freezing". The dimensions of the boxes are given in Table I. (All tables and figures are omitted). Two, different, blast tunnels were used in the tests, as shown in Figs. 1 and 2. Air temperature was varied from -30 to -42°C. Velocity from 0 to 12 m/sec. Different types of herring were used, according to season and availability. A survey of test conditions and main results is given in Table II. The temperatures in individual herring and air were recorded by means of thermocouples, to an accuracy of $\pm 1^\circ\text{C}$. The thermocouples were distributed over 6 or 7 cross-sections of the box. Examples of the temperature development during freezing are given in Figs. 3 to 6, for each of the types of package mentioned. Figs. 7 and 8 give the necessary freezing time as a function of air velocity for an initial fish (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE Author's summary	3. 5 BACTERIA OF PUBLIC HEALTH SIGNIFICANCE ON WHITE FISH PRIOR TO BRINING Spencer, R. and Georgala, D. L. (Humber Laboratory, Hull, England and Torry Research Station, Aberdeen, Scotland) The Microbiology of Fish and Meat Curing Brines, Proceedings of the Second International Symposium on Food Microbiology, 1957, pp. 299-302 (1958) (Department of Scientific and Industrial Research, London, England) Griffiths (1937), in reviewing the evidence available, concluded that <i>Escherichia coli</i> was not a normal inhabitant of the intestinal tract of marine fish, although it could be present in the intestines of fish caught in polluted waters. This conclusion is supported by later work done by Guelin (1952 and 1954) on enterobacteria and their associated bacteriophages. Fish caught in unpolluted sea water have been found not to carry faecal coli or coagulase-positive staphylococci and to carry only occasional coliform bacteria. Despite the relative absence of coliform bacteria and the complete absence of faecal coli from the fish when they are taken from the water, a survey of commercial cod landed at the Hull fish market shows that the fish are contaminated to a small degree when they are landed from the trawlers. The source of this light, but general, contamination of commercial fish is not yet known. Evidence has been obtained, however, that the contamination is unlikely to be caused by the ice delivered to the trawlers, nor is it likely to be accounted for by faecal contamination. Evidence obtained in Aberdeen, Scotland, indicates that unskinned fillets made from commercial fish still contain small numbers of coliform bacteria and faecal coli on the skin. It is likely, therefore, that the actual flesh of the fillets will be contaminated during the filleting process. In spite (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
3. 2383 PROPERTIES OF WRAPPERLESS, LINERLESS, FOOD CARTONS Klein, Marian G. (Marathon Division, American Can Co., Menasha, Wisconsin) Frosted Food Field 27, 17, 18 (July 1958) During the past year, eight equipment suppliers almost simultaneously announced the development of cartoning equipment for sealing linerless, waxed cartons with adhesives. Other suppliers currently are working on heat-seal equipment for polyethylene-coated cartons. Machine developments and improvements in adhesives, printing inks, and carton boards all have contributed to make it possible to seal dry or waxed cartons by mechanical means. One of the first uses for the sealed wax carton has been in the frozen food industry. The main advantage provided by this development is a saving in cost by eliminating the overwrap. A possible disadvantage of this type of container is the fairly low level of moisture protection it can provide. No test data describing the actual protective properties of sealed, waxed cartons have yet been published. Extensive research on this problem, however, is being conducted by carton suppliers and by food packers. In 1953, a series of tests was begun in which frozen meat pies were packaged in waxed, linerless cartons without overwrap. Additional packaging and storage tests have been conducted with other food products including frozen peas, French-fried potatoes, fish sticks, turkey dinners, fruit pies, and macaroni and cheese dinners. The purpose of these studies was to determine the level of moisture protection provided by: (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug	3. 6 THE EFFECTS OF DEHYDRATION ON ACTOMYOSIN IN FISH AND BEEF MUSCLE Hunt, Sheila M. V. and Matheson, N. A. (The Experimental Factory, Aberdeen, Scotland) Food Technology 12, 410-416 (August 1958) Introduction. -- Freeze-drying at the Experimental Factory is carried out on a commercial scale by the vacuum contact-plate drying process. In this process, frozen steaks cut from fish or meat are placed on aluminum trays, covered with lids, and loaded between horizontal heating plates. These plates can be moved together to insure good thermal contact, and they are located in a steel chamber that can be evacuated to a low pressure. In muscle tissue that is used for food, the actin and myosin have combined to form actomyosin, which is present in greater quantities than any other protein. Actomyosin is of interest because it is rather labile, and if it survives a particular treatment, then other proteins and enzymes also will survive. Actomyosin is an enzyme that can hydrolyze adenosine triphosphate (ATP) to adenosine diphosphate (ADP) and inorganic phosphate. Denaturation of actomyosin can be followed by measuring adenosine triphosphatase (ATPase) activity. Other properties of actomyosin that are lost on denaturation are solubility in 0.5 molar potassium or sodium chloride solutions and contraction in the presence of ATP. Purpose. -- This study was made to learn if actomyosin, and hence proteins, in fish and beef could survive the effects of dehydration by the vacuum contact-plate drying method. Materials and methods. -- The moisture in fresh or reconstituted muscle was determined by mixing a weighed, ground sample with sand and heating on a water bath at 100°C. for 1 hour with occasional stirring, after which the muscle was dried to a constant weight or for about 4 hours in (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 3 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

3. 2383

(a) overwrapped and non-overwrapped cartons, (b) various types of end seals on cartons, and (c) various types of carton stock.

With many frozen foods, a major problem during storage is loss of moisture from the product. Dehydration is almost always caused by faulty packaging. The result of dehydration is a discolored, pithy, dry product that may be tough in texture and poor in flavor.

Experimental.--The various food products were packaged under commercial conditions, using the test cartons. The packaged foods were sharp frozen at the food packers' plants and shipped in dry ice to the laboratory where they were stored in a walk-in freezer maintained at 0° F.

The individual packages were removed from the corrugated shipping containers and arranged on wire racks to allow complete circulation on all sides of each package. After a 3-day conditioning period, each package was weighed to within 0.1 gram to establish the initial package weight. The weightings were made inside the 0° F. room.

A number of packages were removed from test after 3, 6, and 9 months of storage. The weight loss of each package was determined, and the package was opened to observe the amount of desiccation that the product had suffered. The food product then was prepared for taste tests. Observations of color, flavor, and texture were recorded by members of a taste panel.

Results.--The data that were collected indicate that products such as pies and dinners, which are packed in aluminum dishes and covered with either a top crust or a sheet of heavy gauge aluminum, require no overwrap for protection. Food in aluminum pans but without a protective lid, such as macaroni and cheese, however, suffered fairly high weight losses at 6 months and showed signs of desiccation at only 3 months.

Fish sticks, frozen peas, and French-fried potatoes suffered extreme weight losses in cartons without overwrap. Even with an overwrap, the fish sticks and French fries showed fairly high weight losses.

3. 2341

temperature of 10° C. and mean air temperature -30° C. The curves correspond to a maximum, recorded final temperature of -4, -12, and -20° C., respectively. Each set of curves corresponds to the following conditions: (1) standard boxes with lid; (2) standard boxes, open; (3) cardboard boxes with lid, with or without water or alginate jelly added; (4) open cardboard boxes, dry herring; (5) open cardboard boxes, herring + water or alginate jelly.

Safe freezing time as a function of air temperature and velocity for the same conditions and a maximum, final core temperature of -12° C. is recorded in Figs. 9 to 13.

The results show that the influence of air velocity on the freezing rate in open containers is considerably greater than for a solid, homogeneous slab, obviously as a result of convection between the herring. In an effort to further increase this effect, freezing by air blast through the herring mass was tried. The arrangement is shown in Fig. 14, the results of 4 tests are given in Table III. Fig. 15 is a diagram of herring and air temperatures for one of the boxes.

It was found that the freezing time can be reduced very considerably by this new method, to as low as 4.2 to 6.4 hours for -30° C. air, depending on the herring characteristics.

When the box is taken out of the freezer, the temperature in the fish is rather uneven. It is of practical interest to know to what maximum core temperature the fish must be cooled, to arrive at a sufficiently low storage temperature after equalization. Additional heat removal in storage, when the boxes are tightly stacked, will necessarily be extremely slow, and should be avoided.

An example of temperature relaxation after freezing is given in Fig. 16. While the equalization over the individual cross-section is fairly complete after 3 or 4 hours, the time for total equalization within the whole box is considerably longer.

Results of 10 relaxation tests are given in Table IV and Fig. 17.

3. 6

an oven at 100° C. To determine moisture in dehydrated material, the sample was ground and dried for 5 hours in a vacuum oven at 70° C. Fat in fresh, dehydrated, or reconstituted muscle was determined by a modification of the Gerber method for the analysis of milk and cheese. Tissue suspensions were prepared by maceration of a known weight of tissue in an all-glass macerator of Townsend and Mercer. Beef round steak or the cod filets (*Gadus callarias*) were macerated to a uniform paste with a few milliliters of water, suspended in 40 to 50 milliliters (ml.) of water, filtered through a single thickness of gauze to remove connective tissue, and made up to a definite volume.

For the determination of catalase, a tissue suspension in 0.1 molar phosphate buffer was added in varying amounts to 2 ml. samples of 0.4-percent hydrogen peroxide. Samples were withdrawn after 1 and 2 minutes, and residual peroxide was titrated with potassium permanganate. ATPase was determined by a modification of the method of DuBois and Potter (1943).

Results.--Catalase, which was selected as a measure of enzyme activity, was not present in sufficient quantity in beef or cod tissue to be determined quantitatively. Measurement of the catalase activity of fresh ox kidney and dehydrated ox kidney, however, showed that about 60 percent of the catalase activity survived dehydration. Measurement of ATPase in beef and in cod before and after dehydration showed that an appreciable amount of the enzyme remained intact. Beef-muscle fibers still were able to contract in the presence of ATP after they had been dehydrated and reconstituted. For this to occur, most of the actomyosin molecule must be relatively undamaged. Dehydration caused the cod actomyosin to become insoluble. When this occurs, the muscle fibers may or may not lose their power to contract, even though one-half of the ATPase activity remains intact. Muscle fibers in dehydrated beef always were contractile after reconstitution, and they too retained about one-half of their ATPase activity. These findings indicate a stepwise denaturation of actomyosin.

3. 5

of these findings in regard to coliform bacteria, the examination of whole fish and fillets have not demonstrated the presence of bacteria of the *Salmonella* or *Shigella* groups.

It may be concluded from the authors' investigations that despite the highly satisfactory bacteriological quality, from the public health aspect, fish taken directly from the sea will become so contaminated during transportation and processing that they will introduce coliform bacteria, faecal coli, and coagulase-positive staphylococci into the brines used in the fishing industry. The survival of these and similar organisms in brines is, therefore, a factor of importance that needs investigation.

2. 9 NUTRITIONAL VALUE OF FISH IN REFERENCE TO ATHEROSCLEROSIS AND CURRENT DIETARY RESEARCH

Butler, Charles (Branch of Technology, U. S. Bureau of Commercial Fisheries, Washington 25, D. C.)
Commercial Fisheries Review 20, 7-16 (July 1958)

There is much in today's news about atherosclerosis, a disorder arising from the deposition of fatty deposits, including cholesterol, in the arteries that supply blood to the heart. In the United States atherosclerosis is presently the cause of approximately one-third of the total deaths of men over 45 years of age. Although there is no agreement on the causes for this disease, it does seem to be of metabolic origin with a deficiency, excess, or imbalance of diet possibly playing an obscure role in relation to disturbed lipid metabolism.

Fish and fishery products offer a number of demonstrated nutritive merits in this or other diseases that evidence nutritional implications. Among these features are: complete and well-balanced protein; ease of digestion; unique fortification with unsaturated fatty acids; and wide choice in fat content, in species (specific flavors and textures), and in market form so that eye and appetite appeal need not be sacrificed to comply with a strict dietary regimen.

Research now under way will accurately pinpoint which of the unsaturated fatty acids are present in fish oils, indicate the degree of essentiality of each of these acids in fat metabolism, and throw further light on the effects of inclusion of these fatty acids in the diet on the deposition of cholesterol in the arteries.

A series of tables are included showing the cholesterol content of some protein foods, the distribution of unsaturated fatty acids in a fish oil, the unsaturated fatty acid composition of oils derived from some marine-animals, land-animals, and vegetables, as well as the proximate composition (over)

COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1, PAGE 5
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Charles Butler

3. 5 CLOSTRIDIUM BOTULINUM TYPE A, FOUND IN FOOD PRESERVED IN CURING BRINE

Lubertina, J. (Universidad Nacional de La Plata, Buenos Aires, Argentina)
The Microbiology of Fish and Meat Curing Brines. Proceedings of the Second International Symposium on Food Microbiology, 1957, pp. 283-288 (1958) (Department of Scientific and Industrial Research, London, England)

During a period of years, many food samples brought to the author's laboratory because they had been the cause of food poisoning have been found to contain *Clostridium botulinum* type A and, less frequently, type B.

One sample was of an "antipasto" containing fish, commercially canned in curing brine, lettuce, onion, tomato, etc., which the patient had eaten 11 or 12 hours before any symptoms occurred. As the amount of toxin absorbed was very small, the patient recovered quickly. The fish was found to contain an organism, strictly anaerobic and spore forming, whose morphological, physiological, and staining characteristics corresponded to those of *Clostridium botulinum* type A.

Experimental. --Because growth of the organism alone is not proof that the food has caused botulism, an assay was made for the toxin. The results of this assay confirmed the theory that the patient had contracted botulism from a small amount of fish preserved in curing brine, and that it contained toxin of *Clostridium botulinum* type A.

An experiment was conducted to determine the resistance to different concentrations of NaCl of the isolated strain of *Clostridium botulinum* type A. Growth was obtained at salt concentrations up to and including 15 percent, but not at 16 or 17 percent. This indicates greater tolerance to salt than

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Kathryn L. Osterhaug

FISH AND ATHEROSCLEROSIS
BOTULISM FROM BRINED FISH

3. 60 THE IN VITRO DIGESTIBILITY AND NUTRITIONAL QUALITY OF DEHYDRATED BEEF, FISH, AND BEANS

Adachi, Richard R.; Sheffner, Leonard; and Spector, Harry (Quartermaster Food and Container Institute for the Armed Forces, Chicago, Illinois)
Food Research 23, 401-406 (July-August 1958)

Introduction. --Interest in the dehydration of foods has increased steadily in recent years. Suitable methods now have been developed for the commercial dehydration of meat, fish, and beans. Recently, Sheffner, Adachi, and Spector (1957) published an in vitro method for a pepsin digest-residue (PDR) index that accurately measures the net utilization value or biological value multiplied by the digestibility of food proteins. This new procedure takes into account not only changes in total amino acid content but also the enzymic availability of the component amino acids. The new procedure has been successfully applied to the nutritional evaluation of heat-processed and irradiated products.

Purpose. --The present study was made to determine by means of the PDR index the nature and extent of the nutritive changes in the proteins of beef, fish, and beans that result from dehydration.

Experimental. --Haddock obtained in the mid-Atlantic Ocean during the latter part of the summer were used in this study. These haddock were held fresh in ice for 6 days before they were filleted. Fillets were frozen in 10-pound blocks and sawed into fish sticks. These sticks were freeze-dehydrated at a plate temperature of 100, 4° F. and at a pressure of 200 to 250 μ for 28 to 29 hours. The resulting dehydrated fish sticks were packed into cans and hermetically sealed under vacuum. Rehydration of the fish sticks was accomplished by soaking them in water for 1 minute at room temperature. Cooking was accomplished by frying the fish sticks for 1 minute in deep fat at 375° F.

(over)

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ABSTRACTER: Martin Heerd

3. 8 LEVAN-PRODUCING HALOPHILIC BACTERIA IN SUGAR-CONTAINING HERRING BRINES

Lindeberg, Gösta (Swedish Institute for Food Preservation Research, Göteborg)
The Microbiology of Fish and Meat Curing Brines. Proceedings of the Second International Symposium on Food Microbiology, 1957, pp. 157-173 (1958) (Department of Scientific and Industrial Research, London, England)

A number of levan-forming *Achromobacter* strains were isolated from rosy sucrose-containing herring brine. These bacteria are obligate moderate halophiles, showing maximum growth at 1-2M NaCl. Sodium ions are specifically required; bromide, sulphate, or phosphate ions may be partially substituted for the chloride ions. The bacteria may be cultivated in synthetic media supplemented with thiamine. Maximum growth occurs at about pH 7. Ammonium ions are used as a source of nitrogen. Nitrate is reduced, and growth in non-aerated media is proportional to the amount of nitrate added. Alanine, glutamic, aspartic and pyruvic acids, as well as intermediates of the tricarboxylic acid cycle, are utilized as sources of carbon and energy. Carbohydrates are not attacked, except that levan is formed from sucrose. The levanucrase catalyzing this process is bound to the cells, and is specifically activated by sodium ions. The enzyme differs from the corresponding enzymes, studied with other bacteria, in being unable to break down raffinose. Although the enzyme in constitutive, aeration of the medium during growth, or addition of nitrate to non-aerated media, greatly enhances the slime-forming activity of the bacterial cells. The slime formation is inhibited in varying degree by the addition of other sugars, the strongest effect being obtained with lactose.

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Authors' summary

DRIED FISH NUTRITIVE VALUE
ROSY HERRING BRINE

3. 5 (Cross Reference: 2. 05)

that found by other investigators. The results of thermal death-time tests indicated that this strain also was exceptionally resistant to heat.

Another of the author's experiences with *Clostridium botulinum* type A involved tins of anchovies preserved in curing brine. Tins that had previously shown a negative test for toxin were found to develop toxin over a period of from 13 months to three years at 20 to 30° C. The tinned anchovies evidently contained spores of *Clostridium botulinum* in a dormant condition.

It appears that the long storage of tins containing food preserved in curing brines may militate against its good condition.

3. 8 (Cross Reference: 3. 5)

2. 9

for some species of marine and fresh-water fish, shellfish, and crustacea.

ADAPTABILITY TO DIETS											
	HERBIVOROUS	OMNIVOROUS	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
	HERBIVOROUS	OMNIVOROUS	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
HERBIVOROUS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OMNIVOROUS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FISH	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SALMON	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MULLET	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
HALIBUT	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TUNA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SHRIMP	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OYSTERS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Fig. 1.--Shows the adaptability of various types of fish and shellfish to diets.

3. 80

Results and discussion.-- PDR index values of fresh, freshly frozen, and stored frozen haddock are shown below in tabular form.

The data show that dehydration, rehydration, and storage did not affect the nutritional quality of haddock. PDR index values of 78 were obtained from fresh and dehydrated haddock. These values are closely comparable to a net protein utilization value of 74 that was obtained from a sample of vacuum-dried haddock by the nitrogen balance method of Maynard and Tunison (1932). Cooking significantly increased the nutritive value of fresh and rehydrated haddock. Dehydrated haddock retained its nutritive value during storage at 100° F. The essential amino acid composition of haddock was found to agree closely with similar composition data reported by Proctor and Lahiry (1956) and Neillands et al. (1949).

Treatment	PDR index values of fresh, dehydrated, cooked, and stored haddock	PDR Index
None (frozen fresh)		78
Fresh cooked		86
Dehydrated		78
Rehydrated		76
Rehydrated cooked		83
Frozen fresh, stored 12 mo., -20° F.		78
Dehydrated, stored 12 mo., -20° F.		80
Dehydrated, stored 12 mo., 40° F.		77
Dehydrated, stored 12 mo., 100° F.		78

0. 33 PRODUCTION AND IDENTIFICATION OF A GREEN PIGMENT FORMED DURING IRRADIATION OF MEAT EXTRACTS Fox, J. B., Jr.; Strehler, Theodora, Bernofsky, Carl; and Schweigert, B. S. (American Meat Institute Foundation and University of Chicago, Illinois) <i>Journal of Agricultural and Food Chemistry</i> 6, 692-696 (September 1958) Evidence obtained in this study identifies the major green pigment produced during the gamma irradiation of meat as being sulfmyoglobin. The reaction apparently takes place in two steps, of which one or both are dependent upon the concentration of hydrogen ion. The first step is the production of hydrosulfide either from glutathione and other thiol-containing compounds already present in the meat or from added sulfhydryl reagents. This reaction is essentially independent of the concentration of hydrogen ion, in the range studied. The amount of hydrosulfide produced at sterilizing doses of gamma radiation is approximately 0.2 micromoles per gram of muscle tissue. Since myoglobin is present in muscle tissue in about the same concentration, this amount of hydrosulfide is adequate to produce the observed amounts of green pigment. The second step is that of the reaction of hydrosulfide ion, oxidant, and myoglobin to produce sulfmyoglobin. The rate of this reaction is greater at pH 5.3 than at higher pH's, which apparently accounts for the greater relative amounts of green pigment produced at the lower pH during irradiation. The destruction of total pigments by irradiation in this region increases sharply with decreasing pH, however, and the net amount of green pigment is somewhat less than at higher pH's. Experiments using hydrosulfide, metmyoglobin, and peroxide as oxidant have yielded only cholemyoglobin as the green pigment. Hence, either hydrogen peroxide is not the active oxidant during irradiation, or the hydrogen peroxide reaction during irradiation is modified by some other agent or condition. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: F. Bruce Sanford	4. 12 DIFFERENTIAL THERMAL ANALYSIS. III. MELTING CURVES OF OILS AND FATS Hanewijk, J. and Haighton, A. J. <i>Journal of the American Oil Chemists' Society</i> 35, 457-461 (September 1958) Two previous papers in this series included (1) the principle, apparatus, and procedure of the differential thermal method of analysis and (2) a description of melting-point curves of a number of pure glycerides. This paper discusses in detail the various factors influencing the shape of the melting-point curves. Some of these factors include the following: (1) rate of heating, (2) dimensions of fat layer (in apparatus), (3) the manner in which crystallization takes place, (4) the pretreatment of the fat, and (5) the reproducibility of measurements. In order to draw the base line of the melting curve, the determinations were started from 10° to about 20° C. below the temperature at which melting set in. Cooling was performed by several procedures. For calibration purposes, a standard fat was used with a short melting range, obtained by repeated crystallization of hardened cottonseed oil from acetone. A number of determinations were carried out with the standard fat, using a selection of 10 sample holders and 8 thermocouples, to check the scattering of results. The differential thermal analysis curves, of both stabilized and unstabilized fats, give information about their melting and polymorphic behavior. The curves can therefore be used for identification. In most liquid oils, two distinctly different crystal forms are detected; the first is unstable and the second, stable. Numerous curves for vegetable and marine oils are illustrated (see over). The following curve for Norwegian herring oil is an example of the type of curve observed for marine oils: (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Edward H. Gruger, Jr.
3. 333 NO SWEAT Anonymous Industrial and Engineering Chemistry 50, 34, 36 (October 1958) Introduction. --Sweating of canned goods is a problem of considerable monetary significance. Sweat damage to canned goods shipped by sea from West Coast ports amounted to almost \$1,000,000 in 1956. This damage has been rising rapidly in recent years. Sweat damage to canned goods occurs primarily during ocean shipment, and it generally occurs as rusting of the can and/or defacing of the labels. Losses are both tangible and intangible. Tangible losses include costs of surveying, segregating, and reconditioning damaged cans; the sale of severely damaged cans for salvage; and the legal and clerical costs of processing claims. Losses of sales and good will are intangible. Causes. --The underlying cause is a simple environmental one. When a ship moves from a relatively cold climate to a warm humid one, the dew point of the air in the hold increases more rapidly than the temperature of the cargo. When dew point and cargo temperature coincide, condensation occurs. A relationship exists, therefore, between the damage that occurs, and the trade route that is used. Eighty percent of all damage occurs on vessels that sail from the West Coast between November and March. The marked increase in sweat-damage claims filed with marine underwriters seems to be due primarily to an increase in the use of electrolytic tin plate by can manufacturers. Hot-dipped tin plate has an equal coating of tin on both sides and is approximately two or three times more rust resistant than electrolytic tin plate, which has only one-fifth as much tin on the exterior as hot-dipped plate. About eight percent of the West Coast pack is shipped by water during the sweat-damage season. Losses on this portion of the pack amount to about 3 cents per case. Any treatment that would have (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt	4. 92 AUTOXIDISED AND HEATED FATS AS A NUTRITIONAL HAZARD - 1. Newman, A. A. Food Manufacture 33, 374-378 (September 1, 1958) Introduction. --Most fats used for human consumption are unsaturated. These fats may undergo a series of changes that will affect their nutritional value. The changes depend upon the amount of (1) unsaturation that exists and (2) heat that is applied. In the presence of air, the changes will consist of peroxidation, polymerization, and partial decomposition, a deteriorative sequence collectively known as "autoxidation" or "oxidative rancidification." If the same fats are heated in the absence or near-absence of air, the process is known as "thermal polymerization," which also results in the formation of unwholesome byproducts. Most of the clinical research work concerned with autoxidized and heated fats involves the use of test animals whose stomachs are organized on an anatomical pattern differing widely from that of man. The experimental regimens to which the animals are submitted are usually too severe to simulate average human conditions. The pathology of autoxidized and heated fats. --Of practical interest are some investigations by Beck and Peacock, of the Glasgow Royal Cancer Hospital, involving processing temperatures that are likely to prevail during the daily preparation of meals in the family kitchen. For the purpose of their experiments, the two workers used a half-and-half mixture of cottonseed and whale oils that were repeatedly heated to 200/220° C. for up to a total period of 12 hours. The following results were obtained with rats that received a feed consisting of bread spread with the above mixture of fats: Of 44 Norwegian hooded rats, surviving more than 4 months, seven developed lesions of the forestomach that appeared to be due to avitaminosis caused through the oxidative destruction of vitamin A by some agents present in the heated fats. Parallel tests conducted on similar rats that were killed for the examination of their livers, confirmed that hepatic depletion of vitamin A had taken place. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 7 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

IRRADIATION OF HEME PIGMENTS

MOISTURE CONDENSATION ON CANS

MELTING CURVES OF FATS

TOXICITY OF HEATED FATS

to be applied to the entire pack in order to protect the vulnerable eight percent should be ruled out. Any treatment that could be used only on the critical portion would still have to cost less than 3 cents per case. Reverting to the more resistant hot-dipped tin plate would add over 4 cents to the cost of an average case.

Control.--The first, and probably the most obvious, control measure is an application of a protective coating to the can. Recent work by a can company has indicated that very thin coatings of enamels, lacquers, or liquid corrosion inhibitors may be effective. The cost of the materials for this treatment is estimated at 0.5 to 1.0 cent per case. This treatment obviously would be economically feasible if it could be applied only to those cans which were to be shipped by water during the sweat-damage season. Here the difference in the operations of canners becomes a factor. A protective coating could not be applied economically to the 65 percent of the pack that is labeled directly from the canning line.

A second control measure, and one which might well be used in connection with protective coating of the can, is the control of dew point conditions in the ship's hold. Such control is complicated by an extensive leakage of air into the cargo spaces and by an almost total lack of instrumentation in the cargo holds. Better sealing of holds and installation of automatic dew point recorders should enable ship's officers to use ventilating equipment to control the dew point of the hold effectively.

A third control measure may be obtained by changing the methods of handling and storing canned goods in cargo vessels. A recent trend toward the loading of unitized pallet loads of canned goods instead of individual cases may solve the problem. Loading the cans into master containers in the canner's warehouse also would provide a degree of thermal insulation. If the cans are warm when they are packed, they are not as subject to sweat damage. Alternatively, the pallet load could be enclosed in polyethylene film or other vapor barrier material at the time it was assembled in the warehouse.

0. 33 (Cross Reference: 3.19, 3. 331)

Beef myoglobin is cleaved between pH 4.0 and 4.5, and the native pigment is both soluble and stable in solution above pH 4.5. The observed denaturation of pigment therefore is due to the gamma irradiation, but the data do not determine whether the pH increases the radiation sensitivity of the heme compounds or vice versa. The denaturation curve has an inflection at pH 5.2 to 5.3, which is the pK value associated with the ionization of the imine nitrogen of the histidine molecule coordinated with the heme iron. Although the oxygenation of myoglobin is insensitive to the ionization of this group, the data suggest that putting a proton on the nitrogen affects the stability of the complex. Since sulfmyoglobin is more unstable than are the native heme pigments from which it is prepared, the observed instability of the irradiation-produced sulfmyoglobin over that of the red pigment or native metmyoglobin may not necessarily be directly attributed to the process of irradiation. The instability of the green pigment, however, suggests that it is one of the pathways of breakdown of the heme pigments during irradiation.

Summary.--(1) Studies of the conditions under which the maximal discoloration of heme pigments occurs, by ionizing radiations, show a maximal relative production of green pigment with respect to red at pH 5.3. (2) The production could be enhanced greatly by the addition of cysteine or other sulfhydryl reagents and inhibited by the addition of aldehydes. (3) This evidence, plus the reactions the green heme pigment undergoes with dithionite and carbon monoxide, identifies it as being sulfmyoglobin. (4) The sulfmyoglobin complex apparently breaks down under either mild oxidizing or reducing conditions to form either metmyoglobin or myoglobin. (5) The protein moiety of the green pigment is partially denatured, and the production of the green pigment is postulated to be one of the steps in the destruction of muscle color by irradiation.

Autoxidative and thermal changes.--The action of oxygen on unsaturated fats leads to the attachment of hydroperoxide ($-OOH$) radicals to the fatty-acid components of the glycerides. The facility with which this process takes place will depend on such factors as degree of unsaturation and the isomeric status of the fatty acids involved. Generally speaking, there will be two favored points of attachment on the carbon chain: (a) the α -methylene position with respect to a double bond and (b) the double bond itself.

During hydroperoxidation, a proportion of the peroxides that form will tend to undergo further changes such as the formation of a complex mixture of reaction products that include cyclic peroxides, peroxidic free radicals of fatty acids, non-peroxidized aldehydes, ketone, keto-aldehydes, hydroxydate and branch-chained compounds, lactones, epoxides, cyclic compounds, and fatty acids with greatly shortened carbon chains. Polymerization, an important stage in the autoxidation process, also is governed by an autocatalytic, free-radical-actuated reaction-scheme.

Isolation of the toxic agents.--Solvent-extraction methods extend from crude single-stage extractions to the more sophisticated multi-stage system used by Chang and Kummerow and the highly efficient counter-current procedures surveyed by Privett, Lundberg and Nickell, or Kaneda, Sakai, and Ishii. Opinions as to the usefulness of molecular distillation range from the belief of Kasas that heating will lead to denaturation to the belief of Norris and co-workers that only negligible changes will take place. Chromatography has not been found entirely suitable for the isolation of toxic agents. Adsorption tends to be somewhat unselective. Urea adduct segregation has proved of some importance because it will permit a division of the reaction mixture along biologically significant lines. If applied to the esterified fatty acids of autoxidized and thermally affected fats, the adduct-forming portion will contain the nutritionally wholesome or only slightly toxic compounds, whereas the non-adduct-forming portion will contain the more deleterious substances.

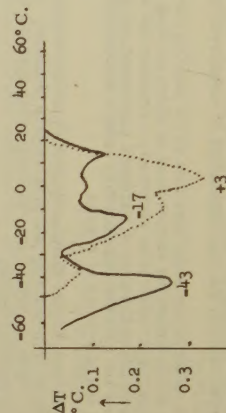


Figure 1.--Differential thermal analysis curve for Norwegian herring oil (—stabilized; nonstabilized.)

4.0 BUREAU OF COMMERCIAL FISHERIES OIL RESEARCH PROGRAM

Slansby, Maurice E. (Seattle, Washington) and Butler, Charles (Bureau of Commercial Fisheries, Washington, D. C.)
Journal of the American Oil Chemists' Society 35, 8, 10, 11, 12 (July 1958)

Table 1. Projects on fish-oil research carried out, or financed by the Bureau of Commercial Fisheries

Program	Project title	Laboratory	Project leader
Analytical methods and composition of fish-oil fatty acids	Structure and analysis of fish-oil fatty acids	Hornel Institute, Univ. of Minn., Austin	W. O. Lundberg
	Composition of fatty acids from salmon egg oil	Fishery Products Lab., Ketchikan, Alaska	O. S. Privett
	Physical and chemical characteristics of fish body oils	North Carolina State College, Raleigh	Robert Kyte
Separations of fish-oil fatty acids	Separations of fish-oil fatty acids and fatty acid derivatives	Fishery Technological Laboratory, Seattle	R. O. Simons
	Application of inclusion type compounds to separation and analysis	Hornel Institute, Univ. of Minn., Austin	Edward Gruger
Reactions of fish-oil fatty acids	New products from fish oils	Fishery Technological Laboratory, Seattle	W. O. Lundberg
	Chemical reactions of fish-oil fatty acids	Hornel Institute, Univ. of Minn., Austin	Herman Schlenk
Composition of fish-oil components other than fatty acids	Analytical methods for fish-oil components	Texas A & M College, College Station	Edward Gruger
	Composition of menhaden oil unsaponifiable fraction	Univ. of Delaware, Newark	W. O. Lundberg
	Reactions of phospholipide complexes of fish oils	North Carolina State College, Raleigh	R. O. Simons

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Reprinted in part

4.90 VITAMIN A ROLE FOR LIVESTOCK, POULTRY

Whitehair, C. Kenneth (Michigan State University)
Feed Bag 34, 10-13, 86 (August 1958)

Vitamin A is an important nutrient required by all species of livestock and poultry for optimum health, growth, reproduction, and lactation. A considerable portion of the vitamin A needed by livestock and poultry is supplied as carotene in feeds of plant origin.

Chemical nature of vitamin A and carotene. -- Both pure vitamin A and carotene now are successfully manufactured on a commercial scale. Vitamin A and carotene are particularly susceptible to destruction by a wide variety of physical and chemical substances employed in the routine processing and preparation of feeds. Some factors that contribute to the destruction of vitamin A and carotene are heat, oxygen, pressure, minerals, ultraviolet light, moisture, and storage.

Variety of functions. -- Vitamin A is required for growth, development of bones and teeth, normal vision, and maintenance of healthy epithelial tissue. Symptoms of vitamin A deficiency are respiratory disturbances, eye involvement, digestive upsets, convulsions, incoordination, paralysis, abortions, and skin lesions. Adequate vitamin A nutrition is necessary to maintain normal resistance of the epithelial tissues to various bacterial infections, but additional amounts of vitamin A will not increase resistance to infections.

Metabolism. -- The metabolism, storage, and utilization of vitamin A and carotene vary according to species, ration, and other factors. Fats and emulsifying agents in general, promote absorption of vitamin A and of carotene. Carotene generally is absorbed more poorly than is vitamin A. Recent information suggests that ingested carotene is converted to vitamin A in the intestinal wall and probably in other tissues as well. Female animals accumulate greater liver sources of vitamin A than do males fed the same ration. Other hormones--as well as factors such as parasitism, infections, and adequacy of the rest of the ration--have an influence on carotene and vitamin A metabolism.

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ABSTRACTER: June H. Olden

FISH OIL RESEARCH PROGRAM

VITAMIN A FOR ANIMALS, FOWL

6.190

NEW PRODUCT DEVELOPMENT FROM UNIVERSITY, EXPERIMENT STATION POINT OF VIEW

Couch, J. R. (Texas A and M College)
Feed Bag 34, 59-60, 62, 66 (August 1958)

Cooperative research by land-grant colleges, universities, and agricultural experiment stations has led to improvements in feed formulations and to development of new products that make it possible for the farmer to produce more meat and more eggs with a smaller amount of feed.

Vitamins. -- During the past 30 years, vitamin deficiencies have been differentiated, sources of vitamins have been determined, and vitamins have been isolated and synthesized. Vitamins A, D₃, E, K, B₁₂, and riboflavin, niacin, choline, calcium pantothenate, vitamin B₆, folic acid, and biotin are now available as feed additives. All of these vitamins now are routinely added to feed formulas with the exception of vitamin B₆, biotin, and folic acid. Emphasis has been placed on the stabilization of vitamins A, D₃, and E in the manufacture of vitamin concentrates for addition to feed formulas.

Unidentified growth factors. -- Data have been reported that indicate there are growth-promoting substances, organic and inorganic, in condensed fish solubles, dried whey, distillers dried soluble, dried brewers yeast, fish meal, antibiotic fermentation residues, dehydrated alfalfa meal, and meat and bone scraps that cannot be accounted for in the known nutrients in these products. Thirty percent of the growth-promoting activity of crude ingredients can be attributed to an unidentified organic factor.

Differentiation of unidentified growth factors. -- The fish solubles factor is found in fish solubles, fish meal, meat and bone scraps, dried whey and other milk by-products, and penicillin mycelia

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ABSTRACTER: June H. Olden

6.32 POLYSACCHARIDES OF THE MARINE ALGAE

Hirst, E. L.

Proceedings of the Chemical Society, pp. 177-187 (July 1958) (London, England)

Introduction. -- A wide range of individual sugar residues is encountered in the algal polysaccharides. Many of these are common to polysaccharides of both the algae and the higher plants. Components of algal polysaccharides include: D-glucose, D-galactose, L-galactose, 3,6-anhydro-D-galactose, 3,6-anhydro-L-galactose, 6-O-methyl-D-galactose, D-mannose, L-fucose, L-rhamnose, D-xylose, L-arabinose, D-mannuronic acid, L-guluronic acid, D-mannitol, glycerol, and pyruvic acid.

Cellulose. -- Seaweeds in general require structural units that will confer flexibility and ease of movement rather than the rigidity needed by land plants. For this reason, it is not to be expected that seaweeds will display the system of cell-wall materials composed of cellulose, hemicellulose, and lignin, which is so characteristic of the normal, rigid plant cell. Instead, a rich development of mucilaginous material is found in the cell wall and between the cells. In many algae, but not in all, the foundation of this structure is a cellulose skeleton that is present in much smaller proportions than it is in the land plants. Chemical examinations of cellulose from numerous seaweeds--including Laminaria spp., Gelidium spp., Iridaea laminarioides, and Fucus vesiculosus--have revealed chemical properties identical to those of normal cellulose. These algal celluloses consist essentially of a long chain of 1,4'-linked β -glucopyranose residues, but the arrangement of the molecules in the cell wall differs markedly from that present in the higher plants.

Starch-like reserve polysaccharides. -- Many algae store their energy reserves in the form of glucans, and largely by analogies based on color reactions, these incorrectly have been designated

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ABSTRACTER: Martin Heerd

DEVELOPMENT, NEW FEED PRODUCTS

ALGAL POLYSACCHARIDES

Variable requirements.--Tissue needs for vitamin A and needs of various species and individuals within a species are widely variable, owing to the multiplicity of factors involved in carotene and vitamin A metabolism. The conversion of carotene to vitamin A varies among different animals. It has been noted that the value of carotene for cattle is dependent on previous amounts of dietary carotene. Thus animals in a depleted condition, as from drought conditions, utilize carotene less efficiently than do cattle that previously were fed an adequate amount.

Value in feeds.--Rich sources of vitamin A, as such, are the fish-liver oils and foods of animal origin--milk, eggs, and liver. The primary source of vitamin A for livestock feeds is plants rich in carotene, such as alfalfa, hay, and roughages. In recent years, commercial production of synthetic vitamin A has become economical enough to use in insuring vitamin A in livestock rations. Maintenance of potency.--To insure an adequacy of vitamin A in rations to be used under a wide variety of feeding operations, stabilization of the carotene-carrying products is becoming more and more important. Stabilizing is accomplished by (1) physical means, wherein small amounts of vitamin A are coated with fat or gelatin to protect the vitamin until it is ingested, and (2) use of effective antioxidants, which prevent the destruction of vitamin A before it is absorbed.

Rations.--Stabilized, synthetic vitamin A is probably the cheapest source of vitamin A for poultry rations, although it does not supply the other vitamins and nutrients that are furnished by dehydrated alfalfa meal and fish-liver oils. The principal source of vitamin A for swine is carotene from yellow corn, pasture, and roughages of good quality. Plentiful amounts of vitamin A are supplied as carotene to cattle and sheep while on good pasture, in addition to which considerable amounts of vitamin A are stored in the liver and other tissues.

Program	Project title	Laboratory	Project leader
Oxidation of fish oils and fish-oil components	Mechanism of oxidation of extracted fish oils	Univ. of California, Berkeley	Harold Olcott
	Oxidation in fish tissue	Univ. of California, Davis	Edwin J. Kuta
Nutritional aspects of fish oils	Chemistry of odor problem in fish oils	Hornell Institute, Univ. of Minn., Austin	A. L. Tappel
	Nutritional aspects of fish oils	Hornell Institute, Univ. of Minn., Austin	W. O. Lundberg
	Fish oils in poultry rations	Univ. of Connecticut, Storrs	J. R. Chipault
	Fish oils as supplements to swine rations	Oregon State College, Corvallis	O. S. Privett
	Effects of processing variables on menhaden oil	Fishery Technological Lab., College Park, Md.	E. P. Singen
Industrial applications	Fish oils and chemical derivatives as fungicides and insecticides	Florida Southern College, Lakeland	Maurice Bender
	Fish oils in lubrication of leathers	Univ. of Cincinnati, Cincinnati, Ohio	Boris Sokoloff
	Preparation of new resins from fish oils	Arthur D. Little, Inc., Cambridge, Mass.	Frederick O'Flaherty
	Fish oil derivatives as ore-flotation agents	Univ. of Minnesota, Minneapolis	George C. Walker Jr.
	Fish-oil derivatives as fungicides	P. L. M. Laboratories, Sarasota, Fla.	S. R. B. Cooke Iwao Iwasaki I. M. Chamelin

as starches. The so-called "Floridean starch" of *Dilsea edulis* departs still further in structure from ordinary starch. It contains 1:4-linked α -D-glucose residues together with 1:1 percent of 1:4:6-linked residues.

Laminarin.--In some of the brown seaweeds, notably in *Laminaria* spp., large quantities of D-glucose are stored in the form of the reserve polysaccharide laminarin. Laminarin from *L. digitata* remains dissolved on cooling in aqueous solution, whereas the laminarin from *L. cloustoni* gradually aggregates and forms a deposit.

Galactans.--Polysaccharides containing galactose residues are of widespread occurrence in seaweeds. They are usually present as sulphates, and in addition to D-galactose, they sometimes contain units of L-galactose. Other types of sugar residue may also be present, including 3:6-anhydro-D (and L)-galactose, 6-O-methylgalactose, D-glucuronic acid, and D-xylose. As examples of this group, mention will be made of the galactan from *Dilsea edulis*, carrageenin from *Chondrus crispus*, and agar from *Gelidium* and other sources.

Fucans.--In many of the brown weeds (notably in *Laminaria* spp. and in *Fucus* spp.), laminarin (based on D-glucose), alginic acid (based ultimately on D-mannose), and mamitol are accompanied by the polysaccharide fucoidin, which is often present in quite large amounts. On hydrolysis, fucoidin gives L-fucose and is to be regarded therefore as stereochemically related to L-galactose. Nevertheless, L-galactose is not usually encountered in the brown weeds, and D-galactose occurs only to a minor extent.

Pentosans.--The manner of occurrence of the pentose sugar residues in the marine algae, in which the sulphate esters of the galactans are not usually associated with arabans or with polyuronides, differentiates these markedly from land plants.

Polyuronides.--D-mannuronic acid and possibly the stereochemically related L-guluronic acid occur widely in marine algae. The characteristic intercellular mucilage of the brown weeds is alginic acid. Its special properties as a colloidal substance of very high molecular weight, containing a large array of carboxyl groups, fit it for use in industry in a wide and still increasing variety of ways.

meal. The fermentation solubles factor is found in grain distillers dried solubles, molasses distillers dried solubles, liver meal, dried brewers yeast, fish solubles, and soybean-oil meal. The grass juice factor is found in fresh forage juice, liver meal, dried brewers yeast, dried whey, dried skim milk, dried buttermilk, soybean-oil meal, and fermentation distillers solubles. The protein factor is found in soybean-oil meal, peanut meal, casein, and some samples of gelatin. The whey factor is found in dried whey and other milk products, distillers dried solubles, and dried brewers yeasts; the fish factor is found in condensed fish solubles, fish meal, meat and bone scraps, and antibiotic fermentation residues; and the alfalfa factor is found in dehydrated alfalfa meal and other dehydrated cereal grasses.

Inorganic unidentified growth factors.--It has been reported that sources of unidentified growth factor contain an inorganic fraction that accounts for approximately one-half of the growth-promoting activity of such crude sources of unidentified growth factor as distillers dried solubles, condensed fish solubles, dried whey, and antibiotic fermentation residues. Report of this has stimulated anew research in the mineral field of nutrition.

Minerals.--Research in universities and agricultural experiment stations has shown the essentiality of zinc, selenium, and molybdenum for the chick and poult and of zinc for the pig. It has been reported that when bromine was added to the diet of chicks, an increase in growth was obtained. Hormones.--Feeding and implantation of diethylstilbestrol increases the rate of gain and improves the feed conversion of steers. Diesterol diacetate has been used, to a lesser extent, in poultry feeds.

SOME FACTORS AFFECTING CELLULOSE DIGESTION BY RUMEN MICROORGANISMS IN VITRO

MacLeod, Robert A. and Murray, J. F. (Fisheries Research Board of Canada, Technological Station, Vancouver, British Columbia)
Journal of Nutrition 60, (October 1956)
Studies 1956, from the Stations of the Fisheries Research Board of Canada, FRB No. 457, 14 pp. (1957)

Using a washed inoculum of rumen microorganisms a chemically defined medium has been developed incorporating at their optimum levels those factors found to be effective in this study in stimulating cellulose digestion. In this medium, responses to amino acids, short-chain fatty acids, various vitamins, glucose, and urea have been demonstrated.

A combination of valine, leucine and isoleucine was found to be primarily responsible for the strong stimulation of cellulose digestion previously shown to be produced by a mixture of 18 amino acids. The combination of leucine, isoleucine and valine could be used interchangeably with and was somewhat more effective than the volatile fatty acids tested in promoting cellulose breakdown.

Of the various vitamins tested, vitamin B₆ was the most consistent in its ability to stimulate cellulose digestion by rumen microorganisms in the medium used.

The level of urea required for maximum stimulation of cellulose digestion varied depending on the cellulolytic factor employed. More was required if the combination of valeric and isovaleric acids was added than if amino acids were used. Optimum cellulose digestion occurred over a comparatively narrow range of nitrogen concentration in the medium. Above this range inhibition occurred.

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Authors' summary

7. 522 A METHOD FOR QUANTITATIVE DETERMINATION OF AMINO ACIDS ON CHROMATOGRAMS COMPLETELY DEVELOPED WITH NINHYDRIN

Yermakova, E. A. (Laboratory of Nutritional Hygiene, Tashkent, U.S.S.R.)
Biochemistry 22, 861-868 (September-October 1957) (Consultants Bureau, Inc., New York 11, N. Y.)

The author states that previously developed methods for the quantitative determination of amino acids on paper chromatograms based on the color produced by reaction with ninhydrin are not very precise because of amino acid absorption losses on the paper. A simple, rapid method for the quantitative determination of amino acids in protein that eliminates this difficulty is presented.

Hydrolysis. --An accurate 8-to-10-mg. sample of protein is placed in a capillary tube with 0.3 ml. of 6 N HCl, sealed, and heated in boiling water for 24 hours. The contents of the capillary are transferred to a porcelain crucible and evaporated to dryness in a water bath.

Transferring hydrolyzate onto paper. --The dry residue is dissolved in water, and a 3-to-10-microliiter sample of protein hydrolyzate, containing 0.6 to 2 mg. of dry protein, is transferred to a 70 x 85 cm. sheet of conventional filter paper.

Chromatography procedure. --Papers are developed, a two-dimensional, descending technique being used. Water-saturated phenol is used to develop the first phase, and n-butanol, glacial acetic acid, and water in a ratio 4:1:5 are used to develop the second phase. Chromatograms are dried at room temperature, sprayed with 0.5 percent ninhydrin in water-saturated n-butanol, and developed for 18 hours at room temperature (in summer, optimum color develops in 12 to 16 hours).

Elution of amino acids from chromatogram. --The spots are cut out, and the pieces of filter paper are extracted with water, the following technique being used: Pieces of filter paper of equal width are

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ABSTRACTER: Herman S. Groninger

VALUE OF FISH SOLUBLES IN NUTRITION

CHROMATO-ASSAY FOR AMINO ACIDS

GRADING FISH FOR QUALITY 3. GRADING OF RECENTLY CUT FILLETS

Castell, C. H. and Greenough, Maxine F. (Fisheries Technological Station, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 15, 729-748 (July 1958)

Purpose. --This paper reports on a study of two problems. Problem 1 is concerned with the organoleptic examination and grading of filets cut from cod and haddock previously graded as gutted or round fish. With any system of grading for quality, a fairly close correlation should exist between (a) grades assigned to whole fish and (b) grades assigned to filets recently cut from these whole fish. Problem 2 is concerned with filets that do not show a relation between quality and trimethylamine (TMA) values. These filets have relatively low TMA values, yet they are poor in quality.

Experimental methods. --Methods used to obtain data are the same as those described in a preceding paper. These include (a) methods of assigning grades to the whole fish, (b) methods for the use of panels in arriving at the grades, and (c) methods of measuring TMA values. Grades assigned to the filets were based on the sensory judgments of experienced plant foremen or experienced Department of Fisheries personnel. Filets free from perceptible spoilage were assigned grade I. Filets that showed some signs of spoilage but were still merchantable were assigned grade II. Filets considered unfit for processing for the frozen-fish trade were assigned grade III.

Experimental results. --In general, the grades assigned to gutted, or round fish, and the grades assigned to filets were very similar. Both gutted or round fish grades, and filet grades showed a close correlation with the TMA value of the fish muscle. When the fish was relatively fresh with a TMA value of 0.1 to 1.5, a slight tendency existed for the judges to be more severe in grading the filets than in grading the corresponding whole fish. As spoilage progressed this trend was reversed.

The results suggest that during the early stages of spoilage the graders found it easier to judge

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ABSTRACTER: Martin Heerd

7. 80 OBJECTIVE SPOILAGE TESTS FOR FISH STORED UNDER CONDITIONS OTHER THAN NORMAL CHILLING IN ICE

Luijpen, A. F. M. G. (Institute for Fishery Products, Ijmuiden, Netherlands)
Journal of the Science of Food and Agriculture 9, 410-417 (July 1958)

This investigation was directed towards assessing the suitability of the trimethylamine-nitrogen (TMA-N) and other objective spoilage analyses in determining the quality of fresh fish stored under conditions deviating from normal chilling in ice.

Experimental. --Experiments were carried out on unskinned cod filets that were cut from fish obtained at the Ijmuiden fish auctions. The washed filets were placed unpacked, skin down, in precision refrigerators in which temperature could be controlled closely and in which high relative humidity could be maintained. Groups of filets were stored at +4, +2, +1, -1, -25, and -32° C. Another group was quick frozen, thawed (6 hours at ambient temperature) and compared with unfrozen filets by storing at +2° C.

Bacterial counts were made on a portion of tissue cut aseptically from the belly section. The samples were incubated in tryptone-meat agar containing 3 percent NaCl at 24° C. for 4 days. For chemical analysis a section of the dorsal muscle was chopped up. TMA and NH₃ in a trichloroacetic acid extract of the muscle were determined by microdiffusion in Conway dishes and the volatile acids assay made using the method of Friedemann. Tyrosine was determined colorimetrically using Folin and Ciocalteu's reagent. Organoleptic grading was carried out by 3 persons familiar with the quality grading of fresh fish.

Results and discussion. --The comparison of the subjective and objective spoilage determinations

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ABSTRACTER: Herman S. Groninger

QUALITY GRADES FOR FISH

OBJECTIVE SPOILAGE TESTS

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arranged in double layers between two microscopic slides. One end of the slide "sandwich" is immersed in a Petri dish containing water, and the other end extends beyond the end of the dish over a collection tube. Capillary flow of water extracts the pigment from the filter paper, and the drops of extract are collected. Evaporation of water is controlled by placing the apparatus in a closed system. Complete extraction takes place in 30 to 60 minutes for faintly colored spots and in 2 to 3 hours for intensely colored spots. This color is stable for 5 hours.

Photometric measurements.--The optical density of the extracts is measured in an echelon photometer equipped with an M-57 light filter, using a water blank. The amino acid content of each spot is found by comparison with corresponding calibration curves of reference amino acids.

The accuracy of the method was shown to be ± 4 percent.

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When various natural materials, in particular whale solubles and beef liver extract, were added to the synthetic medium, some further stimulation of cellulose digestion over that obtained in the synthetic medium alone resulted. Relatively large amounts of the supplements were required to produce the additional response.

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on cod fillets and the difference between keeping times determined objectively and organoleptically are shown in table 1 (omitted). The objective values are given in terms of the threshold value, which is the amount of spoilage product or the bacterial count at the moment the fillet is condemned organoleptically. Using an objective method, the error in the determination of the point of condemnation should not be greater than the error in the organoleptic determination at the same point. A study of the data shows that if this investigation had not included the -2°C . treatment, both bacterial count and the TMA-N estimate would have less than the maximum permissible error.

Ammonia, volatile acid, and tyrosine determinations have greater than maximum permissible error. These analyses proved inadequate because the spoilage threshold values at various temperatures were not sufficiently constant, and the analyses themselves were not sufficiently accurate. Bacterial counts yield constant threshold values, but cannot be carried out with adequate reproducibility. The TMA-N determination complies in the temperature range -1.25 to 4°C . with reasonable norms in respect to constancy of the threshold value and with strict limits in respect to reproducibility. The threshold value of 1.3 mg. percent of TMA-N is somewhat higher than the threshold values of 6 to 10 mg. percent for iced, fresh fish found by Canadian and British investigators. It is known, however, that noticed fish fillets contain larger quantities of volatile base than iced fish of the same quality.

It was found that the bacterial counts and levels of volatile acids, tyrosine, TMA-N, and NH_3 were all reduced in the fillets that were frozen, thawed, and then stored at refrigerated temperatures. The quality as measured organoleptically did not always increase by objective tests. None of the objective methods examined were found useful in measuring the quality of fish which had been frozen, thawed, and then stored.

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the quality of a fish by examining the changes that occurred on the exterior of the whole or gutted fish than by examining the fillet cut from it. This is particularly true if the grader cannot give careful attention to the early spoilage odors that are developing in the fillet. Definite exceptions to the usual close correlation between the quality of cod or haddock fillets and their TMA values were found in bilgy fish, ungutted fish, and certain types of very soft textured fish. These examples may be of very poor quality and still have a relatively low TMA value.

Conclusions.--Judges of fresh fish should be familiar with these exceptions; however, it is doubtful that they will interfere seriously with the practical application of a system of grading cod and haddock on the basis of organoleptic examination as supported by TMA values. Problems associated with "summer softness" are a little more serious to the grader. TMA values will not measure the quality of the flesh if this soft flaky condition is to be given consideration. The author believes that summer softness should be considered as a defect when fish is graded because during July and August softness is a prevalent complaint of fish retailers. During these two months complaints about texture replace complaints about the odor and flavor of fresh haddock fillets.

2, 114 NEW WINCH-HEAD CONTRIBUTES TO GREATER TRAWLER SAFETY Murray, John J. (U. S. Bureau of Commercial Fisheries, Gloucester, Massachusetts) Maine Coast Fisherman <u>13</u>, 12 (November 1958) In an effort to eliminate manual handling of wire cables in two of the most hazardous operations connected with this fishery, the U. S. Fish and Wildlife Service recently installed a new type winch-head on board of the FWS Delaware. Records indicate that many serious accidents occur at the winch-heads when fishermen are using the messenger wire or fish tackle to "hook-up" the towing cables or hoist inboard the fish catch in the cod-end of the trawl net. Both operations entail wrapping the wires around a revolving winch-head, with the friction of the wire on the drum producing the power point for the lifting operation. Depending on the weight and strain involved, from 4 to 7 complete turns of the wire are needed to hook-up the wires or hoist the fish bag. Even under ideal weather conditions, performance of these tasks is considered dangerous, with greatly increased hazards when carried out during rough weather conditions prevailing on the off-shore banks at least 25 percent of the season. Substitution of mechanical for manual handling of these duties should eliminate two especially hazardous tasks. Fabrication of the new winch head was completed recently and installed on board the Delaware. The inner drum of the winch is flange-protected to guard against excessive wire build up, with a holding stud fitted into the center of the drum for attaching the eye splice in the end of the wire. Testing of the device was carried out during a recent trip of the Delaware. Both operations were (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: John J. Murray	3, 331 COLOR AND QUALITY OF CANNED GULF OF MEXICO YELLOWFIN TUNA AS RELATED TO WEIGHT OF FISH Tubman, Arnold W. and McKee, Lynne G. (Fishery Technological Laboratories, College Park, Maryland, and Seattle, Washington, respectively) Commercial Fisheries Review <u>20</u>, 11-14 (September 1958) The dominant factor controlling the quality of canned, Gulf of Mexico yellowfin tuna is the weight of the fish. Both the color and palatability of the canned yellowfin tuna became less desirable as the weight of the fish from which they were processed increased in size. The tuna industry in the Gulf of Mexico was begun in 1956. At that time, little was known of the quality of these fish in the canned state. The purpose of the work reported here was to correlate the quality of the commercially canned tuna with the observable characteristics of the fish. The only observable characteristic that had a significant effect, according to the observations of the authors, was the size of the fish. The weight of the fish apparently was the most important factor in determining (1) the lightness or darkness and (2) the flavor of the canned product. The data in table 1 (omitted) and table 2 (see over) indicate that all of the tuna canned from the Gulf of Mexico yellowfin would grade "light meat" according to the proposed tuna standard but that the variation in quality was great. Inverse ratios were found between (1) the Munsell value at 555 millimicrons and the weight of the fish and (2) the flavor and the weight of the fish. Examination after precook as well as of the resulting pack indicated that the color of the meat from the larger fish tended toward a dark tan, whereas that from the smaller fish tended toward a light color. Changes in texture and flavor also were found to be associated with increased weight. With increasing weight, the meat became coarser in texture, and the flavor of the pack changed from a pleasant, mild, tangy fish flavor to something flat that was not characteristic of the best quality of (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug
3, 235 SANITATION CODE FOR FROZEN FOODS Schmitt, H. P. Canner and Packer, Western Edition <u>127</u>, 36, 37 (November 1958) The Association of Food and Drug Officials of the United States is working on a model sanitation code for the frozen-food industry. Although this code will not be binding upon all public health officials, it undoubtedly will be applied in many areas and will have a wide influence in the industry. In an early series of food handling surveys, it became obvious that a uniform methodology is essential for determining bacteria in frozen foods. The National Association of Frozen Food Packers recently announced that such a uniform methodology for determining total plate count, coliform, and staphylococci has been agreed upon by microbiologists. Particular attention has been focused on prepared frozen foods because these products are potential carriers of bacteria that cause food illnesses. By June of 1958, more than 600 samples of 18 different prepared frozen foods had been collected from food-processing plants and tested in a laboratory. The report that resulted from this survey showed plate counts running from 130 per gram to 28,000,000 per gram. The technical personnel who worked on this survey agree that products manufactured in a "clean" plant have reasonable total count figures. Packers that wish to consolidate and enlarge their position in the market should check their operations against the following "ground rules." 1. Maintain operations on raw and cooked ingredients in separate rooms to eliminate opportunities for cross contamination. (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Kathryn L. Osterhaug	4, 13 THE EFFECT OF DIET ON THE FATTY ACID COMPOSITION OF SEVERAL SPECIES OF FRESH WATER FISH Kelly, Peter B.; Reiser, Raymond; and Hood, Donald W. (Agricultural and Mechanical College of Texas, College Station) Journal of the American Oil Chemists' Society <u>35</u>, 503-505 (October 1958) Introduction. --In a continuation of the study of the origin of the aquatic type of fats, a number of fresh-water fish were fed diets containing 10 percent cottonseed oil and diets containing 10 percent menhaden oil. After the fish had been on these rations for various periods of time, the relative amounts of the polyunsaturated fatty acids of the whole fish were determined. Experimental. -- Four species of fresh-water fish were fed a series of synthetic diets. These diets were: (1) a low-fat diet; (2) a simulated terrestrial-fat type of diet incorporating a commercially refined and winterized cottonseed oil; and (3) a simulated marine-fat diet incorporating menhaden oil. These diets, the same as those used in a previous study of Kelly et al. (1958), were based on egg albumen and starch plus generous amounts of minerals, water, and fat-soluble vitamins. The fats were incorporated at 10 percent of the dry weight of the diet. The fish employed in these experiments were the yellow bullhead (<i>Ameiurus natalis natalis</i>), the common bluegill (<i>Lepomis macrochirus macrochirus</i>), the rock bass (<i>Ambloplites rupestris rupestris</i>), the small-mouth buffalo (<i>Ichthyobus bubalus</i>), and the rainbow trout (<i>Salmo gairdnerii irideus</i>). The fish were kept in aged, aerated, tap water in a 45-gallon aquaria. They were fed once daily; the amounts varied with the size of the fish but approximated about a twenty-fifth of the mass of the fish. Uneaten food was removed. Bullheads were maintained on the fat-free diet for 51 days. They then were separated into three (over) COMMERCIAL FISHERIES ABSTRACTS VOL. XII, NO. 1 PAGE 13 UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE ABSTRACTER: Martin Heerdt

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2. Eliminate from lines, elevators, and belts dead pocket areas where product may be held up and thus provide a place for bacteria to multiply rapidly and seed wholesome product that passes through these areas.
3. Maintain cooked and blanched ingredients at temperatures below 50° F. --the temperature above which food toxins are formed. Scientific evidence has proven that once the toxin forms, it cannot be destroyed by subsequent cooking.
4. Maintain adequate time and temperature records on critical product components during every production run or batch.
5. Adopt personal hygiene rules: (a) Before lineworkers start the shift, whenever a worker moves from a raw- to a cook-ingredient area, as frequently as required to halt bacterial buildup due to the specific nature of handwork, and after visits to the washroom, everyone should wash his hands with a soap containing hexachlorophene. This should be followed, preferably, by a chlorine spray rinse over the hand-wash sink. (b) Workers must refrain from passing their hands over the face, picking at boils and pimples, or scratching the scalp and then directly inoculating the product with bacteria that form toxin. (c) Evidence is conclusive that there is no surer way of placing toxin-forming bacteria in the product than to employ a line worker with an infection on his hand. Band aids furnish no protection against transmitting bacteria. Transfer the worker to a job assignment that does not require his personal handling of any portion of the product before it is frozen.
6. Frequently sanitize lines and equipment that have been designed for minimum down time and maximum production.
7. Freeze product promptly. Freezing of individual packages by plate or tunnel process is superior to blast-freezing master cartons in sub-zero chill rooms. Hauling cased product 50 miles or more to a freezing facility may be hazardous, owing to the delay in prompt freezing. The toxin mentioned earlier forms after 4 hours of product exposure at 50° or higher.
8. Use the method of coding that will permit a shipment to be classified into the finest possible subdivision for ready identification of batch or hourly production. Coding is your insurance against economic loss of an entire lot of embargoed product by providing the means to sample comprehensively and thereby separate the lot into acceptable and rejectable subportions.
9. Ship your product by carriers that guarantee 0° F. transport. All foods age--whether they are frozen, fresh, or canned--and frozen foods age rapidly above zero.

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handled speedily and smoothly on the new drum without manual guidance of the wires.

Application of this device is limited at present to boats equipped with trawling winches capable of reversing action. Because of the difficulty in removing the wire from the drum, the winch must be reversed unless sufficient slack is present to allow the wire to be slipped off the drum. Modifications are indicated before the device can be adapted for use on boats with nonreversible winches.

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groups. For the next 43 days, group 1 was continued on the fat-free diet, group II was maintained on the marine-fat diet, and group III was maintained on the terrestrial-fat diet. Bluegills were treated in the same manner as were the bullheads except that the bluegills were maintained on the fat-free diet for 64 days and on the terrestrial and marine fat diets for 34 days. The rockbass were treated in the same manner as were the bluegills.

Buffalo also were divided into three groups, placed on the test diets immediately after capture, and maintained on these diets for 125 days. Rainbow trout were raised from the eyed eggs and fed only the menhaden diet for 38 days, following the mean hatching time.

Assay methods. --A modification of the American Oil Chemists' Society spectrophotometric method was used in the estimation of the relative amounts of polyunsaturated acids. Because this procedure was not designed for the quantitative determination of the various polyunsaturated acids in fish oils, only the extinction coefficients, $E_{1\text{ cm.}}$, were recorded, and no effort was made to calculate the percentage composition.

Results and discussion. --The extinction coefficients of the oils from the various fish, at the wave lengths of maximum absorption, are summarized in tabular form. With a few possible exceptions, there were no pronounced differences in the composition of any one fresh-water fish on the natural, the low-fat, or the cottonseed rations. The failure of this low-fat ration to cause, after more than 100 days, a decrease in the polyunsaturated fatty acids similar to the decrease that occurs in the marine mullet and land animals is of considerable interest. The fish must synthesize fatty acids with the degrees of unsaturation indicated by the extinction coefficients of the acids extracted from the fish on this low-fat diet. If they do, then the dienolic, trienolic, and tetraenolic acids would appear not to be linoleic, linolenic, and arachidonic acids.

The data also indicate that within the limits imposed by normal variations between species and the limits imposed by the analytical procedures, no differentiation can be made between fresh-water fish and marine fish that have received diets containing cottonseed and menhaden oil. These changes occurred from those that occurred in the marine mullets, the body fat of which lost much of its naturally occurring polyunsaturated acids when the mullet was placed on the low-fat regimen and regained it on the menhaden-oil diet.

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canned fish.

Yield. --Dark meat accounted for 5.5 percent of the weight of the whole uncooked fish. The total of light-meat scrap and dark meat was a fairly constant 11 percent of the weight of the fish. The percentage of canned meat yield increased from 30 percent from a 60-pound fish to 38 percent from a 120-pound fish.

Table 2. -- Canned product evaluation data on eight Gulf of Mexico yellowfin tuna caught in August 1957

Code number	Weight of whole frozen fish	Evaluation of canned products				
		Honey-combing $\frac{1}{2}$	Texture score $\frac{2}{100}$	Appearance score $\frac{2}{100}$	Flavor score $\frac{2}{100}$	Munsell value
	Pounds	+ or -				
Males:						
1	93	-	83	93	93	6.43
2	93.5	-	73	97	93	6.37
3	102	-	93	70	90	6.23
4	115	-	70	77	77	6.33
Females:						
5	86	-	83	93	83	6.53
6	87	-	97	93	97	6.5
7	99	-	63	43	67	5.93
8	114	-	80	83	83	6.3
		1/2 + indicates honeycombing.				
		2/100 indicates a perfect score.				

1/ + indicates honeycombing.

2/ 100 indicates a perfect score.

FISH BYPRODUCTS IN FEEDS

Bird, H. R. (University of Wisconsin, Madison)
Feedstuffs 30, 101-102 (September 13, 1958)

Introduction. -- Fish meal has a long-standing reputation as a source of high-quality protein, minerals, and water-soluble vitamins, both known and unknown. Fish solubles has a well-established but more recent reputation as a source of the same vitamins that occur in fish meal. Fish solubles has a distinctive value because of its unknown vitamin-like factor, whereas fish meal has a distinctive value because of its unknown factor and its high-quality protein. The values are the basis for the recommendation that fish meal or solubles should be used in all broiler mashers, starting mashers, and breeder mashers. The unknown factor is very difficult to study. One experiment may provide clear evidence that chicks need an unknown factor for growth, whereas the next experiment may indicate that they do not need this factor.

Importance of environment. -- In the author's experiments, cleanliness or contamination of the environment appears to be an important factor. Chicks that receive a high level of antibiotic do not respond to a fish meal supplement. Chicks that receive no antibiotic, but that have their feed inoculated during the first week of life with feces from older chicks respond consistently to fish meal.

The author's chick assays were based on a purified diet consisting of sucrose, soybean protein, soybean oil, a small amount of dried whey, methionine, glycine, and mineral and vitamin supplements. This diet was selected in the hope of avoiding the variation that might occur in the growth-factor content of natural feedstuffs.

In every test, a standard sample of fish solubles is fed at levels of 0.5, 1, 2, and 4 percent. The 4-week weights of chicks fed the unknown fish meals are compared with the weights of chicks fed

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ABSTRACTER: Martin Heerdt

6. 3 SELECTED BIBLIOGRAPHY ON ALGAE

Anonymous

Nova Scotia Research Foundation, No. 4, 109 pp. (1958) (Halifax, Nova Scotia)

Introduction

Section A Chemical and physical studies

Part 1. General

Part 2. Red algae and their derivatives

Part 3. Brown algae and their derivatives

Section B Collection and preservation

Section C Culture

Section D Ecology

Section E General and miscellaneous

Section F Noxious algae

Section G Physiology and biology

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Reprinted in part

NUTRITIVE VALUE OF MEALS

BIBLIOGRAPHY ON ALGAE

CHANGES IN THE TOTAL VOLATILE BASE, VOLATILE REDUCING SUBSTANCES AND BACTERIAL COUNT AS INDICES OF FRESH WATER FISH SPOILAGE

Moorjani, M. N.; Iyengar, J. R.; Visweswariah, K.; Bhatia, D. S.; and Subrahmanyam V. (Central Food Technological Research Institute, Mysore)
Food Technology 12, 385-386 (August 1958)

Purpose. -- This study was made to evaluate the quality of fresh-water fish by following changes in volatile reducing substances (VRS) and total volatile base (TVB). In addition, viable bacterial counts were made for comparison purposes. Estimations of trimethylamine nitrogen were not made because preliminary studies indicated that the TVB content of these fish consisted largely of volatile bases other than trimethylamine.

Materials and methods. -- Local varieties of Indian fresh-water fish were used in these studies. These fish were iced shortly after they were caught. Fillets were cut from the sides of the fish, sealed in moisture-proof cellophane bags, and stored at 4° C. and at 30° C. Samples were withdrawn at daily intervals for analysis and were prepared by pressing a suitable amount of the minced fillet in a Carver press to obtain press juice. This juice was centrifuged to yield a clear aqueous portion and samples of this portion were used in the determination of VRS and TVB. VRS were determined by the method of Farber (1949), and TVB was determined by the micro-diffusion method of Conway (1947).

To obtain viable bacterial counts, a 5-gram portion of fillet was cut under aseptic conditions and blended with 45 milliliters (ml.) of sterile water in a tissue homogenizer. Suitable dilutions were made, and the bacterial count was determined by plating on nutrient agar. These plates were incubated at 23° to 25° C. for 3 days. Colonies counted were in the range 30 to 300 per plate.

Results and discussion. -- The progression of spoilage was followed until the fish were no longer edible. An increase in bacterial numbers, as compared with a rise in TVB and VRS for Barbus carmaticus stored at 4° C. and at 30° C., has been used for the presentation of results. Similar (over)

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UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE

ABSTRACTER: Martin Heerdt

8. 0 PURCHASING GUIDES ESTABLISHED FOR TWO INGREDIENTS

Anonymous

Feedstuffs 30, 40 (August 9, 1958)

At its last meeting, the American Feed Manufacturers Association (AFMA) Nutrition Council acted on purchasing guides for condensed fish solubles and dehydrated alfalfa as part of a continuing program of preparing purchasing guides for various feed ingredients. This action was reported in the recently issued proceedings of the AFMA Nutrition Council's 1958 annual meeting.

Guide for condensed fish solubles. -- This purchasing guide is designed to supply a uniform basis for the preparation of procurement specifications by individual purchasing agents. Since conditions and requirements vary greatly in different areas, this guide is not intended to be followed rigidly. If any components of the material vary from the analytical values or the description given below, such variations shall not be cause for rejection unless so specified in the purchase contract. The purchasing guides will be revised as improved methods of judging quality become available.

By definition, condensed fish solubles is the product obtained from condensing the aqueous portion of a mixture resulting from pressing oil from fish.

By analysis, according to Official and Tentative Methods of Analysis of the Association of Official Agricultural Chemists, current edition, and unless otherwise specified, the composition of condensed fish solubles is as follows:

Moisture - 50 percent maximum or as otherwise specified. Toluene distillation is the method assay used to determine moisture.

(over)

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INDICES OF FISH SPOILAGE

COMPOSITION OF FISH SOLUBLES

6, 3

Section H Surveys

Section I Taxonomy and morphology

Section J Utilization

Part 1. Agar.

Part 2. Drugs, cosmetics, pharmaceuticals

Part 3. Economic studies

Part 4. Food products

Part 5. General and miscellaneous

Part 6. Industrial methods

Part 7. Industrial uses

Part 8. Nutrition and agriculture

Part 9. Patents

8, 0 (Cross Reference: 8, 15)

Protein - 30 percent minimum.

Fat - 10 percent maximum.

Fiber - 1.0 percent maximum. Solubles contain no fiber; however, owing to the nature or the method used to determine fiber, the value 1.0 percent has been specified.

Calcium - 1.0 percent maximum.

pH - 5.0 percent maximum.

Salt (NaCl) - as specified.

The physical properties of condensed fish solubles are as follows: odor--fishy; color--light to dark brown; consistency--viscosity shall be uniform throughout the lot; and uniformity--the product shall be well mixed and uniform as to content, pH, and color, throughout the lot.

6, 190

the standard solubles.

Results.--An average of 27 experiments showed that the basal groups weighed 218 grams, whereas those fed 0.5, 1, 2, and 4 percent of the standard fish solubles weighed 226, 234, 251, and 274 grams, respectively. These assays were begun in November 1956, and they have been continued to the present.

Twenty different fishery byproducts, some commercial and some experimental, were compared with the standard fish solubles. Their potency ranged from about one-fourth that of the solubles to a potency equaling that of the solubles. All samples tested contained measurable quantities of unknown growth factor. This factor was not destroyed by ashing. Furthermore, a combination of molybdenum, zinc, and selenium supplements had no effect on growth in these assays. Other meals that had been subjected to controlled processing and storage conditions also were assayed. Thus far, these experiments have not revealed the causes of variation in growth-factor content of fish meals.

The author also conducted experiments to measure the ability of fish meal protein to supplement the proteins of a corn-soybean oil meal diet, or a corn-soybean oil meal-cottonseed meal combination. These basal diets contained a small amount of fish solubles to supply the unknown growth factor. A wide range of variation was encountered among the meals studied, and in this case it was easy to show that overheating damages protein quality. Adding a fish meal of good quality to the all-vegetable protein basal diets improved both rate of growth and efficiency of feed utilization. Adding an overheated fish meal depressed growth and feed efficiency. The "poor" meals encountered have been experimental meals.

7, 80

results were obtained with *Barbus dubius*, *Cirrhina fuliginea*, *Wallago attu*, and *Labeo* spp.

TVB values remained relatively constant while the fish were in a fresh-quality condition, or stage 1. TVB values increased to some extent during the not-fresh-but-still-acceptable stage of quality, or stage 2. TVB values increased significantly during spoilage, or stage 3. During stages 1 and 2, TVB values lagged behind the bacterial counts. A 5-milligram (mg.) increase in TVB per 100 ml. of juice occurred with the first appearance of odor. Off-odors were definitely noticeable after an increase of 10 mg. TVB per 100 ml. of juice. These values can be used as an index of fish spoilage provided the initial value of the fish subject to assay is known. The fresh-water fish used in these studies had initial TVB values of about 9 to 10 mg. percent. These studies show that the maximum increase permissible for fresh-water fish of the species investigated is about 10-mg. percent volatile basic nitrogen.

VRS, expressed as microequivalents reduction per 5 ml. of juice, increased with the onset of spoilage, and this increase was substantiated by organoleptic tests and by bacterial counts. Fillets with VRS values of 8 to 10 were reasonably fresh, whereas fillets with VRS values of no greater than 15 had slight off-odors. A VRS value of greater than 20 was indicative of definite off-odors. Increases in bacterial count were associated with the progressive spoilage of fillets stored at 4° C. and at 30° C. An accurate estimate of quality on the basis of bacterial counts, however, could not be made.

Conclusions.--For fillets of fresh-water fish stored at 4° C. and 30° C. under identical conditions, an interrelationship exists among the changes in TVB, VRS, and viable bacterial counts. When definite spoilage had begun, the increase in TVB over the initial TVB value was much lower than was the corresponding increase in VRS. VRS values in excess of 20 were indicative of definite spoilage.

0. 5	THE APPLICATION OF THERMAL DATA TO THE CALCULATION OF STERILIZING TIMES FOR CANNED FISH Cooper, D. LeB. Journal of the Biological Board of Canada <u>3</u> , No. 2, 100-107 (January-March 1937) (Abstract of this article appears under 3. 33 page 5 - December 1958)	2. 00	THE NONENZYMIC REDUCTION OF TRIMETHYLAMINE OXIDE TO TRIMETHYLAMINE DIMETHYLAMINE, AND FORMALDEHYDE Vaisey, E. B. Canadian Journal of Biochemistry and Physiology <u>34</u> , 1085-1091 (1956) Studies 1956 from the Fisheries Research Board of Canada, FRB 456, 7 pp. (1957) Trimethylamine oxide at 22° to 24° C. is readily reduced by cysteine in the presence of iron or hemoglobin as a catalyst. Trimethylamine is the major product of this reduction, but appreciable amounts of dimethylamine and formaldehyde are also formed. Glutathione could not replace cysteine as a reducing agent, neither could copper or manganese replace iron compounds as catalysts. Larger amounts of iron (Fe ⁺⁺) could also reduce trimethylamine oxide with the formation of the above products.
0. 5	RUSTY HERRING Harrison, F. C. Contributions to Canadian Biology <u>1</u> , Nos. 10 to 18, 279-284 (1923) (Abstract of this article appears under 2. 01 page 1 - November 1958)	2. 00	STUDIES ON THE CHARACTERISTIC ODOR OF SQUID IV. ON THE UNPLEASANT ODOROUS ACID OF RAIN-SPOILED DRIED SQUID Yamanishi, Tei and Kajikawa, Yasuko Bulletin of the Japanese Society of Scientific Fisheries <u>23</u> , Nos. 7 & 8, 483-485 (1957) (English synopsis, figures, and table) Rain-spoiled dried squid that has a bad smell contains an acid with a strong offensive odor. The authors succeeded in isolating this acid in a crystalline form with an empirical formula of C ₉ H ₁₄ O. An infrared spectrum and a paper chromatogram showed the acid to be oxyhexanoic acid, C ₆ H ₁₂ O ₃ .
1. 017	AUSTRALIAN PRAWNS Dall, W.; O'Grady, A.; and Kearns, F. J. Fisheries Newsletter (Australia) <u>15</u> , 3 (February 1956) (Abstract of this article appears under 1. 85 page 1 - November 1956)	2. 01	A BACTERIOLOGICAL AND CHEMICAL STUDY OF CERTAIN PROBLEMS IN LOBSTER CANNING Reed, Guilford B. and MacLeod, D. J. Contributions to Canadian Biology <u>2</u> , No. 1, 3-29 (1924) (Abstract of this article appears under 3. 33 page 7 - September 1958)
1. 017	THE SHARK FISHERY OF THE BASS STRAITS (AUSTRALIA) Bown, J. World Fishing <u>7</u> , 54-56 (July 1958) (Abstract of this article appears under 1. 70 page 1 - December 1958)	2. 01	STUDIES ON PUTREFACTION OF AQUATIC PRODUCTS XXIV. ON SPOILAGE OF SOME SHELLFISHES Simidu, Wataru and Hibiki, Sigeyuki (Kyoto University, Nagahama, Maizuru, Japan) Bulletin of the Japanese Society of Scientific Fisheries <u>23</u> , No. 5, 255-259 (1957) (In English) The volatile base nitrogen, of which the trimethylamine is small and the ammonia is large in amount, is produced in a considerable quantity. Trimethylamine oxide content amounts to fairly large quantities ranging from about 2 mg. percent in oyster to 38 mg. percent in short-necked clam. In the spoilage of shellfish, the histidine in the free state is scarcely detectable (less than 1.0 mg. percent). So-called histamine poisoning would hardly arise as far as the spoilage of shellfish is concerned.

CONVERSION UNITS

1 pound	= 453.59 grams
1 ounce	= 28.350 grams
1 inch	= 2,540 centimeters
1 gallon	= 128 ounces
1 gallon	= 231 cubic inches
1 quart	= 0.9463 liters
1 ounce	= 29,573 milliliters

CONVERSION OF TEMPERATURE SCALES

$$F = 9/5 C + 32$$

$$C = 5/9 (F - 32)$$

SPECIFIC HEAT AND HEAT OF FUSION

Average values of specific heat generally used for fishery products are 0.80 B.t.u. per pound per °F. above freezing and 0.40 B.t.u. per pound per °F. below freezing.

An average heat of fusion generally used for fishery products is 115 B.t.u. per pound. The heat of fusion of ice is 144 B.t.u. per pound.

DEFINITIONS

calorie	.....	heat required to raise the temperature of 1 gram of water 1 degree Centigrade
British thermal unit	.....	252 calories or the heat required to raise the temperature of 1 pound of water 1 degree Fahrenheit
ton of refrigeration	.....	removal of heat at the rate of 12,000 B.t.u. per hour
atmospheric pressure, normal	.....	a pressure at sea level of 14.696 pounds per square inch, absolute
sensible heat	.....	heat added to the body when its temperature is changed
latent heat	.....	heat absorbed or evolved during a change of state, with no change of temperature
heat of fusion	.....	heat absorbed when a solid melts, with no change of temperature
heat of vaporization	.....	heat absorbed when a liquid vaporizes, with no change of temperature
heat of reaction	.....	heat evolved or absorbed during a chemical reaction
heat transmission	.....	flow of heat by conduction, convection, or radiation, singly or in any combination
horsepower	.....	work performed at the rate of 550 foot pounds per second
mechanical equivalent of 1 B.t.u. of heat	.....	heat given off by a total expenditure of 778 foot pounds of energy

COMMON ABBREVIATIONS*

A.	Ångstrom unit(s)	ma.	milliampere(s)
a.c.	alternating current	Mc.	megacycle
alc.	alcohol, alcoholic	mc.	millicurie
alk.	alkaline (not alkali)	Me	methyl (MeOH, methanol)
amp.	ampere(s)	meq.	milliequivalent
anhyd.	anhydrous	m.e.v.	million electron volts
aq.	aqueous	mg.	milligram(s)
at.	atomic (not atom)	ml.	milliliter(s)
at. wt.	atomic weight	mm.	millimeter(s)
Bé.	Baumé	mγ	millimicrogram
biol.	biological	μμ	millimicron(s)
B.O.D.	biochemical oxygen demand	mol.	molecule, molecular
b.p.	boiling point	mol. wt.	molecular weight
B.t.u.	British thermal unit(s)	m.p.	melting point
cal.	calorie(s)	μ	micron(s)
cc.	cubic centimeter(s)	mv.	millivolt(s)
cm.	centimeter(s)	n	index of refraction (n_D^{20} for 20° and sodium light)
d.	density (d_4^{13} specific gravity at 13° referred to water at 4°; d_{20}^{20} at 20° referred to water at the same temperature)	N	normal (as applied to concn.)
d.c.	direct current	petr. ether	petroleum ether
e.m.f.	electromotive force	p.p.m.	parts per million
Et	ethyl (Et ₂ O, ethyl ether)	ppt.	precipitate
e.v.	electron volt(s)	pptd.	precipitated
f.p.	freezing point	pptg.	precipitating
ft.	foot, feet	pptn.	precipitation
g.	gram(s)	qual.	qualitative (not qualitatively)
γ	microgram(s)	quant.	quantitative (not quantitatively)
hr.	hour	r.p.m.	revolutions per minute
in.	inch(es)	sol.	soluble
kcal.	kilocalorie(s)	soln.	solution
kg.	kilogram(s)	sp. gr.	specific gravity
kv.	kilovolt(s)	sp. heat	specific heat
kv.-amp.	kilovolt-ampere(s)	sp. vol.	specific volume
kw.	kilowatt(s)	sq. cm.	square centimeter(s)
kw.-hr.	kilowatt-hour	U.S.P.	United States Pharmacopeia
l.	liter(s)	v.	volt(s)
lb.	pound(s)	vol.	volume (not volatile)
m.	meter(s); also (followed by a figure denoting temperature) melts at, melting at	w.	watt(s)
M.	molar (as applied to concn.)	wt.	weight

* These abbreviations are used by Chemical Abstracts and, accordingly, have wide recognition.

2.03	ENZYMATIC STUDIES ON THE GLYCOLYSIS IN FISH MUSCLE I. ACTIVITY OF PHOSPHORYLASE Ono, Toyoki and Nagayama, Fumio Bulletin of the Japanese Society of Scientific Fisheries 23, No. 5, 260-264 (1957) (English synopsis and figures) The activity of phosphorylase of fish muscle was investigated through the decrease of glycogen and inorganic phosphorus as well as through the increase of reducing sugar in the extract of fish muscle with added glycogen. Optimum pH was found to be in the range pH 5.3 to 7.8. The activity of phosphorylase in fish muscle that had been stored at 25°C. for 6 hours was completely lost.	2.19 ROLE OF ADENOSINETRIPHOSPHORIC ACID (ATP) IN THE COLD PROCESSING AND STORAGE OF FISH Golovkin, N. A. and Pershina, L. I. (Technol. Inst. Refrigerating Ind., Leningrad) Rybnoe Khoz. 33, No. 9, 87-9 (1957) Chemical Abstracts 52, 1502 (January 25, 1958) By running experiments at 0, 3, and 6° and determining the easily hydrolyzable P in the muscle meat of fishes over various periods of time (up to 10 days' storage) it was proved that these muscles will contain an ever increasing amount of ATP, which causes the disassociation of the actomyosin complex in the protein.
2.03	STUDIES ON THE BLACK DISCOLORATION OF LOBSTER III. ON THE CONTROL OF BLACKENING Kakimoto, Daichi and Kanazawa, Akio Bulletin of the Japanese Society of Scientific Fisheries 23, Nos. 7 & 8, 454-457 (1957) (English synopsis, figure, and tables) The production of a blackening substance in a mixture of shrimp blood and L-tyrosine was effectively prevented by tartrate and oxalate buffer solutions of pH 3.2 or 3.4. A considerable prevention effect was observed with aluminum compounds and vitamin C as well as with NaHSO₃.	2.19 FRESH FISH 2. CHANGES IN WEIGHT OF ICED HAKE DURING DIPPING AND BULK STORAGE Cooper, C. E. B. Annual Report Fishing Industry Research Institute for April 11, 1956-December 31, 1956, Cape Town, South Africa 10, 8 (1957) Immersion of iced fish in water or in a solution of salt and sodium benzoate produced gains in weight that ranged from 0.0 to 2.8 percent. This weight was lost during subsequent storage in bulk in ice. Dipping did not affect the overall change in the weight of the fish during transportation by rail.
2.1125	STUDY ON THE FISHING CAPACITIES OF PURSE SEINES III. ON THE DIFFERENCE BETWEEN COTTON AND KYOKURIN PURSE SEINES Itaka, Yunosuke (Kyoto University, Maizuru, Japan) Bulletin of the Japanese Society of Scientific Fisheries 23, Nos. 7 & 8, 344-347 (1957) (In English) The results obtained in the present study suggest that Kyokurin net is more efficient than cotton net in fishing capacity.	2.5 AN INVESTIGATION INTO THE USE OF SALVINIA CUCULLATA FOR THE PRESERVATION OF FISH DURING STORAGE AND TRANSPORT De Silva, N. and Lantz, A. W. (Fisheries Research Station, Calle Face, Colombo, Ceylon) Ceylon Department of Fisheries, Progress Reports Biological and Technological No. 2, 51-55 (July 1955) The claims advanced as to the ability of Salvinia to preserve fish with or without the use of ice were investigated experimentally. It was shown that there is nothing specific in Salvinia to make its use any more advantageous than the use of any other type of green leaves. But owing to the risk of the possible transmission of alimentary diseases, the use of Salvinia in fish packing is shown to be undesirable and dangerous. Hence the need for legislation to control this practice.
2.1125	STUDIES ON THE BEACH SEINES OF TWO-BOAT OPERATION ALONG THE PACIFIC COAST OF AOMORI PREFECTURE I. ON THE CONSTRUCTION OF THE BEACH SEINE OF TWO-BOAT OPERATION USED FOR BOTH MACKEREL AND SARDINE FISHING Kawasaki, Gichi; Nishiyama, Sakuzo; and Nakamura, Hideo (Hokkaido University, Hakodate, Japan) Bulletin of the Faculty of Fisheries, Hokkaido University 8, No. 2, 108-114 (August 1957) (English abstract, tables, and figures) The authors examined the construction of 15 nets for values of twine number, mesh size, length of finished nets, reefing (hopping), one-side length of finished wing net and bag net, wing height, and circumference of the bag net mouth.	2.5 FRESH FISH 4. BRINE FOR TRANSPORTING FISH TO SMOKERIES Dreosti, G. M.; Nachenius, R. J.; and Pienaar, A. G. Annual Report Fishing Industry Research Institute, for April 11, 1956-December 31, 1956, Cape Town, South Africa 10, 11 (1957) Fresh hake were divided into two lots. Lot 1 was transported in crushed ice, whereas lot 2 was transported in salt brine. Both lots then were processed into smoked fillets. Lots 1 and 2 produced an average of 1.165 and 1.075 pounds, respectively, of saleable smoked fillets per ton of raw hake. Smoked fillets from lots 1 and 2 had a shelf life of 25 and 33 hours, respectively; and they received scores of "more-palatable" and "palatable", respectively.

GLOSSARY OF COMMON AND SCIENTIFIC NAMES OF FISH AND SHELLFISH*

Common name	Other common names	Scientific name	Common name	Other common names	Scientific name
Alewife	Branch herring, big-eyed herring, river herring, Blueback, glut herring, shad herring	<i>Pomolobus pseudoharengus</i> <i>Pomolobus aestivalis</i>	Menhaden	Mossbunker, pogey, fatback Jumping mullet, striped mullet, silver mullet	<i>Brevoortia</i> species Mugil species
Anchovy		<i>Engraulis mordax</i>	Ocean perch: Atlantic Pacific	Rosefish, redfish, red perch	<i>Sebastes marinus</i> <i>Sebastes alutus</i>
Cod	Codfish	<i>Gadus morhua</i> (Atlantic) <i>Gadus macrocephalus</i> (Pacific)	Pilchard	Sardine	<i>Sardinops caerulea</i>
Flounder:		<i>Glyptocephalus cynoglossus</i> <i>Pseudopleuronectes dignabilis</i> <i>Limanda ferruginea</i> <i>Hippoglossoides platessoides</i> <i>Pseudopleuronectes americanus</i>	Pollock	Boston bluefish	<i>Pollachius virens</i>
Lemon sole	Dab	<i>Paralichthys</i> species	Rockfish	Rock cod, snapper	<i>Sebastes</i> species (Pacific)
Yellowtail	Sea dab	<i>Pleuronectidae</i> and <i>Bothidae</i> species	Sablefish	Black cod	<i>Anoplopoma fimbria</i>
Blackback	Winter flounder	<i>Paralichthys californicus</i>	Salmon: Atlantic Pacific:		
Dab	Summer flounder, gulf flounder, flounder	<i>Chinook</i> or <i>king</i> <i>Chum</i> or <i>keta</i> <i>Pink</i> <i>Red</i> or <i>sockeye</i> <i>Silver</i> or <i>coho</i>			
Fluke		<i>Melanogrammus aeglefinus</i>	Spanish mackerel	Mackerel	<i>Salmo salar</i> (Atlantic)
'Sole'		<i>Hippoglossus hippoglossus</i> (Atlantic) <i>Hippoglossus stenolepis</i> (Pacific)	Tuna and tunalike fishes: Albacore	Longfin tuna --- Horse mackerel ---	<i>Oncorhynchus tshawytscha</i> <i>Oncorhynchus keta</i> <i>Oncorhynchus gorbusha</i> <i>Oncorhynchus nerka</i> <i>Oncorhynchus kisutch</i>
'California halibut'		<i>Leucichthys arctedi</i> (Great Lakes, except Erie) <i>Etrumeus sadina</i> <i>Clupea harengus</i> (Atlantic) <i>Clupea pallasii</i> (Pacific) <i>Opisthonema oglinum</i>	Bluefin		<i>Scomberomorus maculatus</i>
Haddock	Herring	<i>Trachurus symmetricus</i>	Bonito	Bonito, albacore, false albacore	
Halibut	Horse mackerel	<i>Ophiodon elongatus</i>	Little Skipjack Yellowfin	Striped tuna	
Herring:		<i>Scomber scombrus</i> (Atlantic) <i>Pneumatophorus diego</i> (Pacific)	Whiting		
Lake					
Round					
Sea					
Thread					
Jack mackerel					
Lingcod					
Mackerel					
Crab:			Clam:		
Blue			Cockle	Pompano shells	<i>Cardium corbis</i> (Pacific)
Hard			Coquina	Butter	<i>Donax variabilis</i>
Soft and peelers	Hard-shelled crab	<i>Callinectes sapidus</i>	Hard	Little neck	<i>Saxidomus nuttalli</i> (Pacific)
Dungeness	Soft-shell crab	<i>Cancer magister</i>		Round clam, cherrystone, quahog, little neck	<i>Paphia staminea</i> (Pacific) <i>Venus mercenaria</i> (Atlantic) <i>Venus morleti</i> (Florida)
King	Alaska king crab	<i>Paralithodes camtschatica</i>	Ocean quahog		<i>Cyprina islandica</i>
Rock		<i>Cancer irroratus</i> (New England) <i>Cancer</i> species (California)	Pismo		<i>Tivela stultorum</i> (Pacific)
Stone		<i>Menippe mercenaria</i>	Razor		<i>Ensis</i> species (Atlantic)
Lobster:		<i>Homarus americanus</i> (Atlantic)	Soft	Soft-shell clam, sand clam, nannynose, maninose	<i>Siliqua patula</i> (Pacific)
Northern		<i>Panulirus argus</i> (Atlantic) <i>Panulirus interruptus</i> (Pacific)	Surf		<i>Mya arenaria</i>
Spiny	Sea crawfish, rock lobster	<i>Penaeus setiferus</i> (South) <i>Penaeus duorarum</i> (Atlantic) <i>Penaeus aztecus</i> <i>Xiphopenaeus kroyeri</i> (Gulf) <i>Pandalus</i> species (Atlantic and Pacific) <i>Pandalopsis</i> species (Pacific) <i>Crago</i> species (Pacific)	Oyster: Eastern Pacific (introduced) Western		<i>Spisula solidissima</i>
Shrimp	Prawn		Scallop: Bay Sea	Cove Japanese Olympia, native	<i>Crassostrea virginica</i> <i>Crassostrea gigas</i> <i>Ostrea lurida</i>
					<i>Pecten irradians</i> (Atlantic) <i>Pecten acquisulcatus</i> (Pacific) <i>Pecten magellanicus</i>

* Taken from Fishery Statistics of the United States 1955. Each species listed was caught in excess of 10,000,000 pounds in 1955.

3. 12	THE CHLORTETRACYCLINE (CTC) CONTENT OF CTC-TREATED FISH AND OF "KAMABOKO" MADE FROM THE TREATED FISH Tomiyaama, Tetuo; Yone, Yasuo; and Tsuda, Atsushi Bulletin of the Japanese Society of Scientific Fisheries 23, No. 9, 568-571 (1958) (English synopsis and tables) Only 0.1 mcg. per gram was found in the flesh of "Tai" that was kept under CTC ice (5 p. p. m.). The flesh of croaker and sea eel was found to contain only about 0.05 mcg. per gram.	3. 2495 ASSESSMENT OF STORAGE PERIOD OF FROZEN FISH Anonymous Report of the Food Investigation Board (Great Britain) for 1956, p. 12 (1957) To find a rapid method for assessing the effect of storage time on frozen fish, a device was designed to measure translucency. The decrease in the translucency of chilled fish was found to be too variable to be used as a reliable indicator of the length of time that frozen fish had been held in ice.
3. 12	EFFECTIVENESS OF CHLORTETRACYCLINE (AUREOMYCIN) ON KEEPING QUALITY OF PACIFIC ROUND HERRING, <u>ETRUMEUS MICROPUS</u> Tomiyaama, Tetsuo; Kuroki, Shunichi; Maeda, Denki; Hamada, Moriji; and Honda, Akira (Kyushu Univ., Fukuoka) Nippon Suisan Gakkaishi 22, 120-7 (1956-57) Chemical Abstracts 52, 7562 (May 10, 1958) The spoilage of Pacific round herring was markedly retarded by storing aboard ship in sea water containing 10 p. p. m. chlortetracycline (CTC), in ice containing 5 p. p. m. CTC, or by storage after landing with ice containing 5 p. p. m. CTC when no treatment was given on board ship.	3. 2495 STUDIES ON MUSCLE OF AQUATIC ANIMALS XXXVII. THE INFLUENCE OF FROZEN STORAGE ON MUSCLE PROTEIN OF LIZARD FISH (<u>SAURIDA TUMBIL</u>) Simidu, Usio and Simidu, Wataru (Kyoto University, Maizuru, Japan) Bulletin of the Japanese Society of Scientific Fisheries 23, Nos. 7 & 8, 442-446 (1957) (In English) Change in solubility was greater than changes in other indexes such as free SH group or stickiness. Considering the absence of an increase in free SH groups, the change in the earlier stage of frozen storage may not be real denaturation of muscle protein.
3. 17	EFFECT OF SODIUM NITRITE-CONTAINING ICE ON STORAGE LIFE AND QUALITY OF BALTIC HADDOCK Borowik, Jozef; Fischer, Ewa; Oetrowski, Stanislaw; and Trzesinski, Piotr Przemysl Spozywczy 10, 282-3 (1956) Chemical Abstracts 52, 9471 (June 10, 1958) Ice containing NaNO₂ prolongs freshness of fish by 24 to 48 hours. Fish should be gutted and frozen directly after being caught. The content of NaNO₂ in meat tissue of haddock depends on storage temperature, reduction of NaNO₂, and amount of NaNO₂ penetrating into the tissue.	3. 3349 ROCK LOBSTER 1. SEA WATER REQUIREMENTS AT ROCK LOBSTER CANNERIES Rowan, A. N. Annual Report Fishing Industry Research Institute, Cape Town, South Africa 9, 17 (1955-1956) Rock lobster canneries in South African and Southwest Africa use sea water for washing, fluming, and leaching rock lobster tails. The amount of water consumed in these operations varies from 60 to 380 gallons per carton of lobster tails produced or from 2,000 to 17,400 gallons per hour. The author estimated that 150 gallons per carton or 6,000 gallons per hour would be an adequate amount of water for a factory producing 40 cartons of lobster tails per hour.
3. 18	QUATERNARY AMMONIUM SALTS AS DISINFECTANTS IN MOLLUSK PROCESSING Romagosa, J. A. Anales bromatol. (Madrid) 9, 405-7 (1957) Chemical Abstracts 52, 7563 (May 10, 1958) Quaternary ammonium salts are effective bacteriostatic agents, especially against <u>Escherichia coli</u>. They are not recommended because of the bitter taste they impart.	3. 3349 ROCK LOBSTER 1. PASTEURIZED ROCK LOBSTER TAILS Dreosti, G. M. and van der Merwe, R. P. Annual Report Fishing Industry Research Institute for April-December 1956, Cape Town, South Africa 10, 15 (1957) Half tails of rock lobster in lot 1 were canned, retorted at 235° F. for 38 minutes and stored at room temperature, whereas half tails in lot 2 were canned, steamed at 212° F. for 30 minutes, and stored at 40° F. Both lots were sampled at intervals during a 2-month period of storage. Retorted lobster flesh had a cooked odor and flavor; however, it was not tough or elastic. Pasteurized lobster flesh was elastic, tough, and possessed of an odor and flavor similar to freshly boiled tails. It was completely tenderized if removed from the can and boiled for 15 minutes.
3. 19	BEHAVIOUR OF REFRIGERATED FISH FILLETS AFTER IRRADIATION WITH ULTRAVIOLET LIGHT Monzini, A. and Botalla, G. Ann. Sper. agr. 10, 1447-1455 (1956) Food Science Abstracts 29, 521 (December 1957)	

LIST OF PUBLICATIONS REGULARLY ABSTRACTED

Analyst	Gourmet
Analytical Chemistry	Industrial and Engineering Chemistry
Archives of Biochemistry and Biophysics	Industrial Refrigeration
Biochemical Journal	Institutions
Bulletin of the Faculty of Fisheries, Hokkaido University	Journal of Agricultural and Food Chemistry
Bulletin of the Japanese Society of Scientific Fisheries	Journal of Applied Chemistry
California Fish and Game	Journal of Biological Chemistry
Canadian Fisherman	Journal of Nutrition
Canadian Journal of Chemistry	Journal of the American Chemical Society
Canadian Journal of Technology	Journal of the American Dietetic Association
Canner and Freezer	Journal of the American Oil Chemists' Society
Chemical Abstracts	Journal of the Association of Official Agricultural Chemists
Chemical and Engineering News	Journal of the Fisheries Research Board of Canada
Chemical Engineering	Journal of the Science of Food and Agriculture
Chemical Processing	Maine Coast Fisherman
Chemistry and Industry	Modern Packaging
Commercial Fisheries Review	Modern Refrigeration
Drug and Cosmetic Industry	National Fisherman
FAO Fisheries Bulletin	National Provisioner
Federation Proceedings	Nature
Feed Bag (supersedes Flour and Feed)	Nutrition Reviews
Feedstuffs	Pacific Fisherman
Fisheries Newsletter (Australia)	Pan American Fisherman
Fish, Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.	Poultry Science
Fish, Res. Bd. Can., Prog. Repts. Pacific Coast Stas.	Practical Home Economics
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Food Science Abstracts	Western Fisheries
Food Technology	World Fisheries Abstracts
Frosted Food Field	World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

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Editorial Clerk (Typist)--Gladys K. Chandler

4. 8 A FINE KETTLE OF FISH Anonymous Chemical and Engineering News <u>34</u>, 5710, 5712 (November 19, 1956) 4. 80 NEW PRODUCTS FROM FISH OILS PART IV. PRELIMINARY INVESTIGATIONS ON ALKYL HALIDES, SILICONES, AND QUATERNARY AMMONIUM SALTS Gruger, Edward H., Jr. Commercial Fisheries Review (Technology Supplement) <u>19</u>, No. 4a, 18-23 (April 1957) (Abstract of this article appears under 4. 29 page 13 - November 1957)	6. 193 UNIDENTIFIED GROWTH FACTORS REQUIRED BY CHICKS AND POULTS 5. TURKEY BROILER STUDIES INVOLVING PRACTICAL TYPE RATIONS Combs, G. F.; Romoser, G. L.; and Nicholson, J. L. (University of Maryland, College Park) Poultry Science <u>36</u>, 1222-1227 (November 1957) Three experiments involving Maryland Medium White and Beltsville White turkey broilers reared in floor pens with litter failed to show any improvement in growth or feed efficiency when dried brewers' yeast, dried whey, dried distillers' molasses solubles, dried corn distillers' solubles, dried butyl fermentation solubles, or other fermentation products were added alone or in combinations to corn-soybean oil meal rations containing sources of fish factor.
4. 81 INCREASING USE OF THE UNION'S FISH OIL FOR EDIBLE FAT PROCESSING Anonymous Food Industr. S. Afr. <u>8</u>, 37, 39 (1955) Food Science Abstracts <u>29</u>, 34 (February 1957) More than half the annual output of fish oil in South Africa has been used successfully in the manufacture of edible fats to supplement the groundnut and sunflower seed oils normally used. Maabanker oil is especially suitable on account of its low degree of unsaturation, pichard oil is also used, although to a lesser extent. A brief description is given of the processing of fish oil.	6. 193 EFFECT OF DIFFERENT PROTEIN SOURCES IN ANIMAL NUTRITION Schiller, Klare (Inst. Tierernahr. Forschung. Landwirtschaft, Braunschweig-Volkenrode, Ger.) Arch. Tierernahr. <u>7</u>, 244-9 (1957) Chemical Abstracts <u>52</u>, 13134 (August 10, 1958) III. Comparison of fishmeal, soybean meal, barley and potato. -- The supplementary effect of fishmeal, soybean meal, barley, and potato was investigated in combined N-balance and growing experiments. IV. Biological value of corn protein byproducts and some supplementary mixtures with dried skim milk, fish meal, and soybean oil meal.
4. 91 EFFECT OF OILS ON BILE-ACID SECRETION Lewis, B. The Lancet No. 7030, 1090 (May 24, 1958) Journal of the American Dietetic Association <u>34</u>, 968 (September 1958) Bile-acid excretion has been studied during the administration of various types of fat to three patients with complete bile fistulae. Sunflower-seed oil (by mouth) and cotton-seed oil (intravenously), both of which are highly unsaturated, produced a remarkable increase in the rate of cholic-acid secretion, which preceded the fall in serum cholesterol. On the other hand, a saturated fat (hydrogenated coconut oil) did not affect the bile-acid output, but raised the serum cholesterol. These findings support the hypothesis that the mechanism by which the serum cholesterol is reduced by certain vegetable oils involves accelerated catabolism of cholesterol to cholic acid.	6. 37 BIOLOGICAL VALUE OF ALGAE PROTEIN Anonymous Nutrition Reviews <u>16</u>, 22-23 (January 1958) Cultured algae can serve as an efficient source of protein that has high biological value. 6. 37 NEW FEED ADDITIVE MADE FROM SEAWEED Anonymous Feedstuffs <u>30</u>, 7 (September 13, 1958) A new feed additive, processed from the seaweed, <i>Oscophyllum nodosum</i>, found along the coast of Norway, is being introduced to the American feed industry. The additive is dry, meal-like, free flowing, and nonhygroscopic. It blends freely into feed materials and reportedly is a good low-cost source of 12 vitamins, 60 minerals, and possibly of unidentified factors. If fed at the 1 to 2 percent level in animal and poultry rations, the new additive reportedly increases gains and production in livestock.
4. 92 STUDIES ON THE NUTRITIVE VALUE OF LIPIDS XIII. SEBORRHEA FORMING ACTIVITY OF ESTERS OF FATTY ACIDS WITH HIGHER ALCOHOLS UPON THE RATS (2) PREVENTIVE METHODS OF SEBORRHEA Kaneda, Takashi; Sakai, Hisea; and Ishii, Seinosuke Bulletin of the Japanese Society of Scientific Fisheries <u>23</u>, No. 6, 324-330 (1957) (English synopsis and tables) In the present study, it is not the genuine cephalin but the crude cephalin that protected the rats fed with sperm whale oil or oleyl oleate from seborrhea. The cephalin fraction was prepared by solvent extraction and very likely was contaminated with other substances.	

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0. 38 GUANINE METABOLISM IN FISH I. OCCURRENCE OF A GUANINE-DEAMINATING ENZYME IN FISH SKIN Lindahl, Per Eric and Svard, Per Olov (Univ. Uppsala, Swed.) Acta Chem. Scand. 11, 846-53 (1957) Chemical Abstracts 52, 8396 (May 25, 1958) II. Guanosine phosphorylase in fish skin, --Ibid., 854-8.	4. 89 REPORT ON DEVELOPMENT OF FUNGICIDES FROM FISH OIL Lee, Charles F. (Fishery Technological Laboratory, College Park, Maryland) Commercial Fisheries Review 20, 20 (June 1958) Most of the newer organic pest-control chemicals are highly toxic, and very low tolerances have been set, or in some cases, no residue is permissible. Fish-oil compounds on the other hand are essentially nontoxic to humans. It is the opinion of the contractor that this fact will eventually counterbalance the relatively high cost and low activity of fish-oil derivatives, and that these may yet be developed to complete with the new synthetic compounds for insect and fungi control, especially for leafy vegetables and mature fruit.
0. 38 ENZYMES ACTING ON VITAMINS. MULTIPLE NATURE OF THIAMINASES Giri, K. V. (Indian Inst. Sci., Bangalore) J. Vitaminol. (Osaka) 4, 59-60 (1958) Chemical Abstracts 52, 14728 (September 10, 1958)	4. 89 A HUGE PLANT FOR MAKING STRAIGHT-CHAIN PRIMARY ALCOHOLS Anonymous Chemical Week 83, 61-62 (September 27, 1958) A plant for making straight-chain primary alcohols from petroleum is being planned for construction at Ponce City, Oklahoma. The alcohols made in this plant will be called alfois, and they will contain 6, 8, 10, 12, 14, 16, 18 or more even-numbered carbon atoms. In the past, these products have been available only from conventionally processed natural oils and fats. The process for the making of low-cost synthetic alfois is based on Ziegler chemistry. Alfois may be used to make synthetic detergents, lubricating oil additives, plasticizers, cosmetics, emulsifiers, and paper and textile chemicals.
0. 38 NEW PROPERTY OF THE CRYSTALLINE STYLE CRASSOSTREA VIRGINICA Dean, David (University of Connecticut, Storrs) Science 128, 837 (October 10, 1958) These studies demonstrate the ability of the oyster style to attack certain algal cells only during or for a very short period after the dissolution of the style. The substance responsible for this phenomenon is heat-labile and is thought to be an enzyme.	8. 42 STUDIES ON THE RADIOACTIVITY IN CERTAIN PELAGIC FISH V. CONFIRMATION AND DETERMINATION OF RADIOACTIVE ELEMENTS IN CONTAMINATED FISHES CAUGHT IN 1956 (PART 1) Tozawa, Harumi; Tokue, Yoko; and Amano, Keishi Bulletin of the Japanese Society of Scientific Fisheries 23, No. 6, 335-341 (1957) (English synopsis, figures, and tables) The present paper deals with radiochemical analysis that was carried out for the confirmation and determination of radioactive elements contained in the liver of a yellowfin tuna and in the muscle of a big-eyed tuna caught at the station near 10°N, 157° 30' E by the research vessel, Shunkofu-Maru, on her second expedition to the Bikini area in June 1956.
4. 11 LIPIDS OF THE MUSCLE OF TUNA, THYNNUS ORIENTALIS LECITHINS OF THE DARK-COLORED AND ORDINARY MUSCLES Igarashi, Hisanao; Zama, Koichi; and Katada, Munao Bulletin of the Japanese Society of Scientific Fisheries 23, No. 5, 273-277 (1957) (English synopsis and tables) Mixed fatty acids from these lecithins were separated into solid, lower, and higher-unsaturated acids, by lead salts-ethanol and lithium salts-acetone fractionations. Saturated acids and hydrogenated polyethylenic acids were chromatographed as their 2,4-dinitrophenylhydrazides; and mono and diethylenic acids were chromatographed as their mercuric acetate complexes. Fatty acids of the lecithin from dark-colored muscle were more unsaturated than those from ordinary muscle. Cephalins acetalphospholipids and sphingomyelin were also shown to be in the ethanol extracts of these tissues.	8. 42 FISH IN THE SODIUM-RESTRICTED DIET Osterhaug, Kathryn L. Pacific Fisherman 56, 40-41 (October 1958) The sodium content of the various species of salt-water fish ranged from 34 to 96 milligrams per 100 grams of fish and averaged 68 milligrams. The sodium content of various species of freshwater fish ranged from 38 to 84 milligrams per 100 grams of fish and averaged 56 milligrams. From these figures, it is obvious that even the fish with the highest content of sodium are within the limits set for diets of low sodium content.
4. 11 PAPER CHROMATOGRAPHY OF EGG LECITHINS Inouye, Yoshiyuki and Noda, Manjiro (Saikyo University, Kyoto, Japan) Archives of Biochemistry and Biophysics 76, 271-285 (August 1958) Egg lecithins have been fractionated as their mercuric acetate addition compounds by reversed-phase paper chromatography. The component fatty acids of the original and chromatographically fractionated lecithins and the fatty acids on the α'- and β-ester positions have been clarified by use of paper chromatographic and spectrophotometric methods. The distribution of fatty acids in egg lecithins is discussed.	

